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BULLETIN OF THE HISTORY OF MEDICINE

ORGAN OF THE AMERICAN ASSOCIATION OF THE HISTORY OF MEDICINE
AND THE JOHNS HOPKINS INSTITUTE OF THE HISTORY OF MEDICINE

Founded by HENRY E. SIGERIST

Editor—OWSEI TEMKIN

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Editor—OWSEI TEMKIN

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THE LOUSE IN GREEK ANTIQUITY,

WITH COMMENTS ON THE DIAGNOSIS OF THE ATHENIAN PLAGUE AS RECORDED BY THUCYDIDES *

HARRY KEIL

Life in Athens during the fifth century B. C. has often been described on the basis of the bright and idealistic picture presented by the outstanding intellects who flourished there at that time. Miller's book (1), for example, contains a detailed, entertaining and informative account of the ancient Greeks and their daily pursuits, but, aside from a brief discussion of superstitions and of slavery in Athens and in Sparta, nowhere do we find any mention of such less inspiring topics as prostitution, sexual aberrations, and the like (see note A). Undoubtedly a Kinsey report at that time would have been most illuminating. Perhaps the only reference to unhygienic conditions to be found in Miller's treatise concerns the point that people who went out at night had to carry torches or lanterns to avoid stumbling over garbage or filth that had been dumped into public streets (1a). Indeed, the reader is left with the distinct impression that the Athenians, imbued with the cult of physical beauty, spent a large part of their lives in bathing and oiling themselves in the bath houses or at home. Somewhat similar views were expressed by Birt (3) who

* From the Montefiore Hospital for Chronic Diseases, Department of Dermatology and Syphilis.

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declared that the lack of references to pediculosis in ancient Greece was due to the precepts of cleanliness and to the extensive facilities for bathing. Shrewsbury (4) admitted that the poor among the ancient Greeks may have had lice but felt that there was no evidence to justify a belief in widespread infestation. In this statement, which was chiefly based on the authority of Miller's book, an implied comparative absence of pediculi during the Athenian plague (430 B. C.) was advanced as one of the principal bulwarks for the rejection of the diagnosis of typhus fever. During the Peloponnesian War, practically the whole population of Attica was compressed within the confines of Athens, owing to the influx of people from the rural and adjacent territory, and this greatly increased population lived under conditions of war and of poor housing (see note B). Among the persons crowded within Athens, aside from the resident and other foreigners, were slaves who outnumbered considerably the citizen population (see note C). There is no substantial evidence to indicate that the lower strata of society, in the city as well as in the rural districts, shared the hygienic precepts of their superiors, and data will be presented to show that even the upper classes were acquainted with pediculosis. In general, these points cannot be illustrated in the surviving medical treatises, and we are therefore obliged, for the most part, to seek evidence of pediculosis in the available, although fragmentary, writings of poets, historians, playwrights, philosophers, and the like. The types of human lice mentioned are admittedly difficult to classify in all instances. It will, however, suffice, for present purposes to establish the probably wide occurrence of pediculosis as a whole and to infer from the context the variety of lice under consideration.

I

The available records seem to indicate that an incipient Greek medical and dermatological nomenclature was established definitely during Hippocratic times (fifth to fourth centuries B. C.). Probably the term phtheir (φθείρ) or louse, in the sense of corruption, was taken over from popular speech for technical application by physicians, scientists, and the more educated people. Prior to the Hippocratic period, the word phtheir or louse occurred in a number of lay works. Perhaps the earliest reference to this term has been preserved in a fragment of the poet Archilochus (10) (seventh century B. C.), and possibly this fragment was part of a fable recorded by the poet. According to tradition, the "dark" philosopher Heracleitus (11a, b, c) (sixth century B. C.) pointed out that "men are deceived over the recognition of visible things, in the same way as Homer,

who was the wisest of all the Hellenes; for he too was deceived by boys killing lice, who said: 'What we saw and caught, that we leave behind; but what we did not see and did not catch, that we bring'" (see note D). Birt (3) cited this story to imply that knowledge of pediculosis was restricted to the lower strata of society and that for this reason Homer was unable to solve the riddle involving lice. Whatever the truth of this tradition, the anecdote would, in my view, rather support the belief that pediculosis was known to all classes of society in the dim past of Greek history. According to tradition (12), also, Phalanthus (eighth century B. C.), the legendary founder of Tarentum, had undoubtedly a bad case of pediculosis capitis. In the midst of the misfortunes assailing him prior to the founding of the colony, his wife wept copious tears as she picked out lice from Phalanthus's scalp. The wetness caused by his lachrymose spouse proved to be the event that fulfilled the prophesy made by the Delphian oracle, for thereupon success attended his efforts and Tarentum was founded. Phalanthus was a Spartan, and we shall have occasion to mention the occurrence of pediculosis in other Spartans. Among the ancient Greeks of the seventh and sixth centuries B. C., Alcman (the erotic Spartan poet) and Pherecydes (the teacher of Pythagoras) were reported by Aristotle (13) to have been consumed by pediculi. Aristotle's conception of the "lousy disease" need not be considered here in detail; it suffices to note that under certain conditions phthiriasis implied the notion of a *systemic* ailment capable of killing the patient. Among the writings of Diogenes Laertius (14a) there is found a spurious letter written by Pherecydes to Thales; in this letter Pherecydes, bewailing his fate, confidently predicted his demise from the lice that were devouring him. Another tradition (15) that is closer in time to the Peloponnesian War concerned King Agesilaus of Sparta (fifth to fourth centuries B. C.). While sacrificing to Minerva, he was bitten by a louse. Agesilaus was not ashamed to kill the beast in public, and he used this event to illustrate what would happen to his enemies, even within the abode of the gods. The Spartan reputation for pediculosis capitis is in accord with Shipley's (16) suggestion that the Spartan youths oiled their locks before battle because they probably feared the head louse.

The ancient Greek fable of the lice and the countryman (see note E) was said by Appian (18), the Greek historian of the second century, to have been used by the tyrant Sulla (81 B. C.) for the political purpose of justifying the slaying of Q. Lucretius Ofella. In this fable a farmer while plowing was bitten by lice. He stopped his work twice in order to shake the insects out of his shirt. When bitten a third time, he burned

his shirt in a drastic effort to stop this unwarranted interference with his plowing. Thus, Sulla used this parable to explain his great patience with, and the final destruction of, his rival (see note F). There is hardly any doubt that on clinical grounds this story was concerned with pediculosis of the body, pediculosis vestimenti.

An important fragment preserved from a play by Eubulus (19a) (early fourth century B. C.) referred apparently to the old custom of cutting the hair short during the mourning period (see note G). This funereal tonsure was described in terms of shearing the hair " as far as the louse." The vividness of this expression in relation to such a serious context implies strongly unusual familiarity with pediculosis capitis.

Herodotus (484-425 B. C.) (21) recorded the behavior of the Libyan lice-biters and of the Egyptian priests who shaved the entire body every third day in order to avoid infestation with pediculi. Although these references in Herodotus do not directly concern the Greeks, this writer was evidently acquainted with lice, at least in a theoretical sense, and by the same token a similar awareness on the part of his audience may be assumed without doing violence to the facts.

It is interesting that the Hippocratic Corpus (fifth to fourth centuries B. C.) contained no reference to pediculosis as a specific local or general disease, nor were prescriptions recorded for the treatment of this ailment. Yet, the Hippocratic writer of Internal Affections (22) was undoubtedly acquainted with the beast, for in recording a case of acute mania, he described the patient as pulling off the threads of his bed-clothes as though they were lice.

In several comedies of Aristophanes (fifth to fourth centuries B. C.) the allusions to ordinary lice were unmistakable and were probably understood by the throngs of people, in all walks of life, who witnessed the staging of the plays. For example, in The Plutus (388 B. C.) pediculosis was mentioned as occurring among the poor (23a). During the winter these poverty-stricken people huddled around a stove in the bath house, where they not only accidentally received burns but probably also passed on their lice. It would indeed be the height of irony if these infested persons had been the cause of spread of pediculosis among members of the upper classes who frequented the bath houses. Again, in The Peace (423 B. C.), Aristophanes jocularly described the battles waged by the Athenians against lice (23b), and this metaphorical description of military tactics was much appreciated during those warring times (see note H).

There is considerable evidence that the upper classes of Athens in the

fifth and fourth centuries B. C. became aware of pediculosis. In The Sophist (24), for example, Plato (427-347 B. C.) placed the art of louse-catching on a plane with that of generalship, although he admitted that tracking down lice was less pretentious. It is not known whether this statement was based on personal experience, but Plato's lice later became proverbial (see note I). It is related that when Aristippus (14c) (c. 435-350 B. C.) was reproached for exposing his son, he crudely declared: "Phlegm, too, and lice we know to be of our own begetting, but for all that, because they are useless, we cast them as far from us as possible." Athenaeus (27), on the authority of Apollodorus (second century B. C.) referred to the high-class prostitute Phanostrate who, perhaps in the less palmy days of her career, was dubbed "louse-gate" by the Athenians because she picked lice from herself as she stood at the door. This courtesan had been mentioned by Demosthenes (28) (384-322 B. C.) in one of his speeches. That ladies of doubtful reputation were acquainted with pediculosis was moreover implied in the imaginary letter of Alciphron (third century), in which Leontion, writing to Lamia, described Epicurus (342-271 B. C.) as a "louse-ridden valetudinarian" (29). Callisthenes (fourth century B. C.), a nephew of Aristotle, became infested with lice during imprisonment by Alexander the Great, but it is not clear whether he died from phthiriasis or because he was thrown to the lions (14a). This story illustrates the acquisition of pediculosis in prison (see note J).

In the course of this presentation I have had occasion to refer to a number of Greek philosophers who were acquainted with lice, either directly or indirectly. To this list may be added the names of Socrates (30) (469-399 B. C.) (see note K), Democritus (30) (c. 460 B. C.) and Speussipus (34) (c. 407-339 B. C.), all of whom were later said to have died from the "lousy disease." These stories are probably, in part at least, fictitious. It is interesting for our purposes to record, without discussing the reasons for these calumnies, the large number of outstanding intellects who were by tradition or by slander or both accused of being infested with lice, for behind these stories were serious implications. In some fragments of the writings of Aristophon (19b) (fourth century B. C.) the Pythagoreans were given the reputation of being dirty and lousy in a literal sense, and the brief description reminds one of vagabond's disease. On the other hand, it is truly remarkable to find no recorded evidence of pediculosis among the Cynics whose reputation for uncleanliness was later deplored by Epictetus. Throughout the ages the "brain trusters" have been subjected to vilification and mistrust, merited in some but not in all instances.

Aristotle (384-322 B. C.) (13) was probably the first to discuss pediculi in a scientific sense, and he recognized the occurrence of this type of insect in a wide variety of animals. He was certainly familiar with pediculosis pubis and pediculosis capitis, and his concept of systemic phthiriasis probably referred, in part at least, to pediculosis vestimenti. In the field of pediculosis in man, Aristotle posed the major concepts that were destined to maintain dominion until well into the nineteenth century. It should be noted that the Greeks in antiquity had no valid conception of the transmission of disease, except perhaps in a few affections. So far as pediculosis was concerned, there is no evidence to indicate a real understanding of the mode of transmission, the conception of this disease being dominated by Aristotle's theory of spontaneous generation.

Strange to say, the first record of a cured case of pediculosis is found in the votive tablets at Epidaurus (35) (fourth to third centuries B. C.), where remarkable cures were wrought during temple sleep or incubation. To this temple, according to the account, came Kleinatis, who was afflicted with lice over the body. At night he saw a vision in which the god stripped him naked and with a broom brushed away the lice. When day came, he left cured. Some authors, such as Herzog (36), have identified the parasite involved as phthirus pubis (pubic louse). In my opinion a more rational diagnosis, assuming the cure of Kleinatis was lasting, would be that of pediculosis vestimenti. A simple change of clothing often, but not always, results in cure of this condition since the body louse generally lives in garments and lays its eggs in fibers of clothing. Contrariwise, in the case of the head or public lice, brushing away the pediculi would be ineffectual for complete relief, owing to the subsequent development of the adherent nits deposited on the hairs of the body. It seems remarkable that the cure of a case of pediculosis was recorded in the manner of a miracle, and perhaps relief from such infestations was not always readily obtained in those days.

Granting that some of the stories cited were partly or wholly fictitious, the bulk of evidence leaves hardly any doubt that the three types of human lice occurred among the ancient Greeks, including the Athenians of the fifth century B. C. With reference to the pediculus vestimenti in particular, the evidence likewise supports the belief that this variety of louse was well known to all classes of Greek society. That pediculosis was probably more common than has been suspected may be surmised from the lack of knowledge of the mode of transmission. During the Peloponnesian War the conditions were even more favorable for an increase in incidence, although no one can say to what extent. It should be remem-

bered that the information collected for this article has been culled from the writings which have survived the ravages of time and that these writings probably represent but a small fraction of those actually penned by the Greeks. This point is further illustrated by the references to pediculosis found in the surviving plays and fragments of plays by Livius Andronicus (c. 284-204 B. C.), Plautus (c. 254-184 B. C.), and others who were, for the most part, translators and adapters of Greek plays written during the periods of the Middle and New Comedy, the original writings being no longer existent (see note L). Whereas there is no way of computing the probable incidence of lice, particularly pediculus vestimenti, among the Greeks of classical antiquity, the data cited support the belief that, in evaluating the nature of the Athenian Plague, the possibility of widespread pediculosis cannot be dismissed summarily.

II

The Plague of Athens has been the theme of an abundant literature, which has been featured by a wide variety of suggested diagnoses. Among the opinions advanced have been: bubonic plague, smallpox, scarlet fever, measles, typhus fever, typhoid fever, syphilis, dengue, ergotism, and others, singly or combined. Some authors have even claimed that this disease was unique and has not been observed again since that time. Different as these diagnoses are, most writers have made out a reasonable case for their respective beliefs, which a priori would indicate the indefiniteness of the description left by Thucydides (5).

It must be remembered that Thucydides was a layman albeit of unusual ability in the historical and literary fields. It is true that he lived in Athens during the plague; indeed, he was one of its victims (429 B. C.). Yet, it is probable that his account of the plague was, in some measure at least, based on hearsay. Certainly his attitude was not that of a professional physician (see note M). Moreover, the description of the disease left by Thucydides was probably a composite one and framed in much the same way as many speeches found in his work. No one knows how much of the description represented admixture with other concurrent ailments, although it must be admitted that the impression of a single disease is created in the mind of the reader. Despite the graphic picture, vital medical details are lacking. In support of Thucydides, it has been said that physicians of his time could not have provided a better report; and there is no reason to doubt that the doctors in Athens were baffled and helpless in their treatment of the affection. Notwithstanding the

truth of these assertions, such a description of disease, whether penned by a physician or a layman, would still remain defective.

Some comments on the nature of the skin lesions recorded by Thucydides seem to be in order, for a great deal of weight has been laid on these manifestations for purposes of diagnosis. In the original Greek text the wording is as follows: *φλυκταίναις μικραίς καὶ ἕλκεσίν* (literally, "small phlyctenules and ulcers"). It must be stressed again that an incipient dermatological nomenclature was apparently first evolved in the Hippocratic era (fifth to fourth centuries B. C.), but even in the medical treatises of the Hippocratic Corpus the terminology often remained obscure. The word "phlyctenules" was applied to any one of a number of primary cutaneous lesions, singly or combined, such as vesicles, papulo-vesicles, pustules, bullae, and the like. In the Hippocratic writings, for example, the blisters found in chilblains were called phlyctenules; likewise, the papulo-vesicular, vesicular, or papulo-pustular lesions observed in the course of bouts of sweating in patients with empyema of the lungs (which I interpret as simple sweat rashes) were labelled as phlyctenules (see note N). Considered from the layman's point of view, a more non-committal translation would be warranted, such as "small pimples." The term *helkos*, which completes Thucydides' description of the eruption, often also had an obscure connotation; it could denote any lesion varying from a simple erosion to a genuine ulcer, but in many instances the translation is best served by the non-committal word "sore." These non-committal interpretations of ancient medical and lay writings are often justified, owing to the obscurities involved. However, in the former instance the context sometimes provides additional data permitting a more accurate opinion as to the nature of the dermatosis. It would be unwise to conclude that, since the skin lesions fall into no definite category when studied in relation to the constitutional signs and symptoms given by Thucydides, the Plague of Athens was unique and has not since recurred. Such a view cannot eliminate the possibility of a defective medical description or interpretation. The fault may not entirely lie with Thucydides since, aside from having been a layman, he may have written in language we do not fully understand (see note O). Having reviewed the other clinical data recorded by Thucydides and considering what has already been said about the writer, I must regretfully conclude that no precise diagnosis is possible, although I am partial to typhus fever as the essential cause of the plague.

Despite the authority of such men as Willan and Zinsser, I am unable to accept this disease as smallpox, although the description of the cutane-

ous lesions, interpreted literally across a span of two milleniums, would seem to be consistent with this diagnosis. Shrewsbury (4) cited some clinical observations at variance with this opinion, but in my view the essential point that rules out this diagnosis is the absence of any mention of scarring. Epidemic smallpox without the sequela of scarring seems inconceivable.

Shrewsbury (4) attempted to build an imposing edifice on the basis of such a phenomenon as the patients' trying to plunge into cold water. Having found examples of this behavior in " virgin " communities afflicted with widespread and severe measles, and having failed to encounter instances of this manifestation in epidemics of typhus fever, this evidence was used to support the diagnosis of measles. However, in the Black Assize of 1577, which has been accepted widely as epidemic typhus fever (see note P), Wood (40) recorded that some patients " leaped headlong into deep waters though none perished. . . . Others ran like mad in the streets." Such behavior during severe illness is not sufficiently distinctive for differential diagnosis, particularly when observed in populations under the heel of hysteria.

It would be unhistorical to argue that, since Thucydides did not mention lice, typhus fever was an unlikely cause of the Plague of Athens. For example, Thucydides was apparently not acquainted with the striking observation that lice desert those about to die. In the first century Plutarch (41) was aware of this phenomenon, for in discussing the question of flattery, he said that flatterers were like the lice that abandon the dead. Apollonius Dyscolus (42) (early second century) cited Aristotle to have known this fact. In the early part of the third century Alexander Aphrodisias (43), the famous commentator of Aristotle, discussed this phenomenon in the form of a problem. That this knowledge goes back to Aristotle seems possible, although I have been unable to trace the original passage in any of his extant works. More important, the relation of lice to typhus fever was not definitively established until the early part of the twentieth century. Even Fracastorius (44a) (sixteenth century), who has been credited with the first good description of typhus fever (see note A), was completely unaware of the part played by pediculi in the transmission of this disease, and this ignorance was continually displayed in the succeeding centuries. For example, when lice were mentioned in the seventeenth and eighteenth centuries by observers who recorded epidemics of typhus fever under the name of Hungarian fever, the relation between the insect and the disease was not suspected. In the words of Greenwood (48) : " Even in the student days of men still living,

the mechanism of conveyance from the sick to the healthy was unknown (in respect to typhus fever); indeed, it is only within the present generation that the conveyance by body lice has been universally accepted and demonstrated in a way acceptable to all."

I do not believe that invoking the concept of a new disease affecting "virgin" population for the first time is helpful in arriving at a precise diagnosis, although the hypothesis itself, considered broadly, seems to be based on reasonable grounds. A critical examination of the authors cited by Shrewsbury (4) in support of this view reveals data at variance with this belief; for example, during the famous epidemics of measles in the Pacific Islands those natives who lived under more favorable hygienic conditions suffered far less than the same stock of natives who lived under extremely poor hygienic conditions and were terror-stricken (see note R). Those who invoke the concept of "virgin" populations must be careful to analyze all the circumstances involved; otherwise, this hypothesis threatens to become an uncritical dogma in historical medicine.

NOTES

A. A more satisfactory account of life in ancient Greece, although still incomplete in some respects, may be found in reference 2.

B. It must be noted that the Plague of Athens first attacked the Greeks in Piraeus, the harbor town of Athens, where the fleet was anchored. Whether the possible subsequent multiplication of prisoners in the jails of Athens may have been a factor in the origin or spread of the disease is unknown; the impression left by Thucydides (5) is that only the Athenians were affected by the disease.

C. Data bearing on the population of Athens and of Attica during this period are partially ambiguous and contradictory; nor does there seem to be unimpeachable information on the number of persons in the various classes of inhabitants. Gomme (6a) calculated that in 430 B. C. the population of Athens, its port Piraeus, and the environs totalled 155,000 in all, being composed of 60,000 citizens, 25,000 resident foreigners, 35,000 domestic slaves, and 35,000 industrial slaves. Rostovtzeff (7) cited the following figures for the population of Athens (431 B. C.): 315,500 (including metics and slaves), of which 172,000 were citizens. Gulick (8) estimated that in the fifth century B. C. Attica, which was one-tenth the size of Massachusetts, had a population of not more than one-half million people, perhaps less. According to Major (9), more than 400,000 persons were crowded within Athens during the plague: the city had a population of 200,000 citizens, and the slaves equalled the citizens in number (no mention is made of the metics or resident foreigners). Beloch's figures (50) for the population of Attica and of Athens are somewhat lower than those already cited, but, when analyzed closely, seem to indicate that, at the beginning of the Peloponnesian War, the population of Athens

became about doubled in number. Miller (1b) said that, of 8 to 9 men in Athens during the general period under consideration, 2 were citizens; 1, a resident foreigner; and 4 to 5, slaves. In another passage Miller (1c) noted that this proportion of slaves to citizens was increased to a ratio of 10 to 1 when one considered the numerous slaves owned by the State which paid them wages. Gardner and Jevons (2a) also agreed that the slaves were many times as numerous as the citizens. In a census (309 B. C.), taken about a hundred years after the Peloponnesian War, Attica had about 400,000 slaves (2b). It must be remembered that the slaves in Athens were usually foreigners (6b).

D. The tradition concerning Homer and the riddle of the lice had an interesting career in ancient times. In the case of this tradition, at least, it is noteworthy to observe the changes in certain details as the story was passed on. The fragment of Heracleitus merely related that boys proposed this riddle to Homer. This fragment in the original Greek was taken from Hippolytus of Rome (11c) (third century) and may be found in various translations in German (11b), French (11c) and English (11a). In the first century both Valerius Maximus (11d) and Plutarch (11e) said the enigma had been posed by fishermen and that Homer, chagrined by his failure to guess the answer, gave up the ghost. In the Life of Homer, attributed by some to Herodotus (11f) (fifth century B. C.), probably falsely, the children of fishermen were responsible for the riddle, but this time Homer did not die from the mortification of failing to reach the correct solution of the problem, rather his death resulted from some severe disease, the nature of which is not described. In the Contest of Homer and Hesiod (51), which in its present form dates back to the second century but which seems to be based on a version of the Sophist Alcidamus (c. 400 B. C.), a pupil of Gorgias and a competitor of Isocrates (52, 53), Homer failed to solve the riddle and in obedience to an oracle died three days later as a result of slipping and falling on his side. Important light has been thrown on the relation between the foregoing work and Alcidamus as revealed in a comparatively recently excavated papyrus roll (Univ. Mich. no. 2754), dated second to third century, and in this version (54) the riddle of the lice is repeated. Within the past year Kirk (1950) (55) *has accepted the fragment of Heracleitus as genuine on the basis of a philologic study of the language characteristics.* For our purposes, therefore, assuming Kirk's opinion to be correct, knowledge of the louse surely existed among the ancient Greeks in the sixth century B. C. It should be noted, also, that Heracleitus belonged to the aristocratic class.

The further vicissitudes of this famous riddle will be considered elsewhere. Given adequate time and many intermediaries with sufficient imagination, traditional stories are apt to undergo significant alterations.

E. Some editors, such as Halm (17), have included this fable among those credited to Aesop (sixth century B. C.).

F. According to Plutarch, Sulla himself died in 78 B. C. from the "lousy disease."

G. In the Alcestis of Euripides (20) (dated 438 B. C.), Admetus shaved or

clipped the hair of his head during the mourning period for Alcestis. I am indebted to Dr. I. E. Drabkin for calling to my attention this interesting confirmation of this tonsorial custom among the Greeks.

H. The translation of these lines, as given by B. B. Rogers, indicates that pediculosis was a well-known theme to the predecessors and rivals of Aristophanes.

> "Our Poet is free to acknowledge that he
> is deserving of high commendation.
> It was he that advancing, unaided, alone
> compelled the immediate cessation
> Of the jokes which his rivals were cutting at rags
> and the battles they waged with the lice
> It was he that indignantly swept from the stage
> the paltry ignoble device."
>
> (lines 738 seq.).

Norwood (56), discussing this passage, referred to flea-campaigns, perhaps a genteel way of getting around lice. The literature on pediculosis has other examples of authors who were apparently embarrassed at the prospect of a literal translation of the term "phtheir."

I. The death of Plato from the "lousy disease" was reported by Diogenes Laertius (14b) (third century) on the authority of Myronianus of Amestris and of Philo of Athens. So far as I know, the latter two sources are no longer in existence. Birt (25) believed that "Plato's lice" were named after the philosopher who, Birt claimed, had pursued studies in botany and in zoology. The implication is that Aristotle, his pupil, was in some way indebted to Plato for his knowledge of pediculi. I am unable to accept Birt's opinion for many reasons, of which only two will suffice for the present discussion: firstly, the louse was known long before Plato; secondly, it is likely that "Plato's lice" was an expression used in a derogatory sense. Plato seemed to be more preoccupied with the abstract, the ethereal, and the eternal than with the small insignificant creatures arising from putrefaction and by spontaneous generation. It required the mind of an Aristotle (26) to focus attention on the marvels in the world of small creatures, at least in a scientific sense.

J. Other versions of this story are found in Plutarch (61) who reported that Callisthenes had been hanged at Alexander's orders, or died of sickness while in prison, or expired from the acquisition of lice after being kept in chains for several months. In the second century Arrian (62) said that Callisthenes died of sickness (nature of illness not stated) or from torture followed by hanging, but Arrian did not specifically mention lice. Ancient history also records that Eunus (c. 150 B. C.), who led the revolt of the Sicilian slaves, was finally captured by the Romans and thrown into an underground prison where he died from hunger and lice (63). These data suggest that phthiriasis and imprisonment probably often accompanied one another.

K. Everyone knows that Socrates died from drinking hemlock while in prison. On what possible grounds could lice have been associated with this philosopher?

The cleanliness of Socrates and his followers was certainly impugned by Aristophanes (31), and Xenophon (49a) reported the accusation of Antiphon the Sophist who said to Socrates: ". . . the cloak you wear is not only a poor thing, but is never changed summer or winter. . . ." It is interesting that Aulus Gellius (32) stated that Socrates had gone through the Peloponnesian War without contracting the plague. There is a remote possibility that, if Socrates became afflicted with lice, this affection might have been acquired at the end of his life. Socrates, after having been adjudged guilty of impiety and of corrupting the youth, was not immediately put to death, but, owing to certain circumstances, remained in prison for about thirty days (33, 49b). It is therefore possible that the jail might have been the source of pediculosis. Reference has already been made in the main body of the text to the case of Callisthenes (14d) who probably acquired lice while in prison. This speculative discussion must be tempered in the light of the possibility that such stories might have their foundation in the rancor of opposing sects and enemies. There is considerable reason for believing that under the influence of malice, jealousy, and hatred for whatever cause, tales of this sort were fashioned on the flimsiest evidence, and certainly the interpretation of such evidence was often given a prejudiced twist.

L. Birt (57) has argued that the references to lice in Livius Andronicus, Plautus and others reflected conditions in Rome rather than those described in their Greek models. To support this opinion he noted that these men wrote at a time in Roman history when the public baths had not yet been instituted and when hygienic conditions were poor. Moreover, Terence, who had the reputation of following faithfully the Greek playwrights, did not mention pediculosis in the surviving texts of his plays. There is undoubtedly a considerable measure of truth in Birt's assertions, but I am unable to accept them in full mainly because the Greeks *were* acquainted with lice and because we lack the original Greek sources which were used as models by the Roman writers. Contrary to the opinion expressed by Birt regarding the efficacy of baths, it is well known that bathing per se may not be adequate to prevent the multiplication of all the varieties of pediculi.

M. According to Littré (37), Galen stated that Thucydides in his description of the Plague of Athens had written only for the vulgar and had given an account without scientific significance. It might be noted, also, that Lucretius' (38) description of the plague, which was founded chiefly, if not entirely, on Thucydides, has little value from a medical point of view because the poet gave vent to his fancy in a free and liberal license.

N. The references to phlyctenules in the Hippocratic Corpus as edited by E. Littré may be classified as follows:

(a) in the probable sense of sweat eruptions seen in association with empyema or other conditions, as in Progn. 17 (vol. 2, p. 155), Coan Pren. 396 (vol. 5, p. 673), and possibly Coan Pren. 458 (vol. 5, p. 687).

(b) in the sense of blisters, such as those caused by fire, as in Ancient Medicine 16 (vol. 1, p. 611), Humors 2 (vol. 5, p. 479), and Epid. 2, 1 (vol. 5, p. 73).

(c) in the probable sense of blisters filled with pus or simple pustules, as in Fractures 21 (vol. 3, p. 491).

(d) in the probable sense of minute vesicles with erosions at the uterine orifice, as in Nature of Woman 108 (vol. 7, p. 423).

(e) in the probable sense of eczematous contact dermatitis (primary lesions include erythema, papule, vesicle, or bulla) following a cosmetic application, as in Dis. Women Bk. II, 191 (vol. 8, p. 371).

(f) in the probable sense of a hemorrhagic bulla, as in Epid. I, case 9, 13 (vol. 2, p. 705). The interpretation of this case has been disputed, but in my view the description of the eruption and the clinical course are consistent with the diagnosis of severe erysipelas.

On the whole, these references seem to indicate that under the term phlyctenule a vesicular, pustular, or bullous lesion was meant.

O. It should be noted that Thucydides' description of the Athenian Plague was based on events transpiring during the *summer* of 429 B. C. It is therefore within the realm of possibility that the skin lesions recorded were actually those of sweat eruptions. If this surmise were correct, the terminology of Thucydides would approach that of the Hippocratic writers. It is interesting that Manicus (45e) reported an abundance of miliaria superimposed on measles in the epidemic of 1846 on the Faroe Islands. This complication he ascribed to a feeling of constriction in the throat, and he ignored the factor of profuse sweating which he had recorded in another part of his report. Jeanneret-Minkine (60) (1915) observed miliary sudamina in some groups of cases of typhus fever.

P. I am unable to accept the interpretation that the Black Assize of 1577 was caused by measles. It has been stated (58, 59) that Vegleri described an epidemic of typhus fever in Angora, in which the patients exhibited severe thirst and threw themselves into the water. The original reference (Galenos, 1880, p. 144) was not available to me for evaluation.

Q. It is interesting that Fracastor (44b) considered the Athenian plague as analogous to the typhus fever seen by him in Italy.

R. The concept that a disease which strikes a population for the first time manifests itself in a particularly severe form has been accepted by many medical authorities. But the proof for this view still remains tenuous in my opinion. Let me cite from several references that have been used in support of this hypothesis.

Corney (44) reported on an epidemic of measles in the Fiji Islands in 1875. It is true that he witnessed the events toward the end of the epidemic, but his paper certainly shows evidence of a strenuous effort to collect the data as impartially as possible. Among the natives in the Fiji Islands, the mortality was about 25 per cent. However, among the 147 members of the Armed Native Constabulary, all of whom contracted the disease, the mortality rate was about 6 per cent. Among the laborers indentured to planters and to merchants, the mortality was comparatively small. Although no precise figures were given for the latter group, the implication is that the mortality rate was less than 6 per cent. Corney concluded that . . .

" in the case of the epidemic of measles in Fiji, more stress has been generally laid upon this hypothesis (the greater virulence of disease in " virgin " populations) than the facts warrant. . . ." Stallybrass (47) (1931), analyzing these data from the point of view of racial susceptibility concluded: " But there can be little doubt that the ignorance and inhumanity of the natives and the fact that whole populations were almost simultaneously afflicted, so that there were few that were well to attend to the sick and provide them with food, were at least potent factors in the production of this high mortality as any racial susceptibility."

In the first epidemic of measles in Samoa, *Davies* (46) said: " Nine-tenths of the deaths might have been prevented by care in diet . . . and *there were no deaths among those who followed instructions and who were under one's own personal supervision.*"

In the epidemic of measles on the Faroe Islands in 1846 (actually the second visitation of this disease since 1781), Panum (45a) reported a case fatality of 2.8 per cent among 6100 cases of this affection. The deaths occurred *chiefly among very old people, in infants under 1 year of age*, and " in a few others who were imprudent." Moreover, " in childhood and in adolescence, measles was little, if at all, more dangerous in the Faroes in 1846 than it is in other countries today (45b)." Indeed, Panum (45c) even vaccinated 60 children in order to observe the relation between the two diseases, measles and vaccinia, each of which ran its own course. Manicus (45d) observed that the afflicted natives frequently had to work during the course of illness. The vast majority of the non-immune population was attacked by measles, whereas those who had had the disease in 1781 were unaffected in 1846. But measles was by no means inevitable among the non-immune, for with proper precautions certain communities were spared. In my view these data do not support the belief that the non-immune people in the Faroe Islands suffered from measles in any peculiar way. If it were possible to segregate early in life a group of persons descended from an immune population, and if such a group were comparable to the one on the Faroe Islands in 1846, it would be interesting to see whether the results of exposure to measles under the same conditions would differ in any striking way. My own guess, if such an experiment were possible, would be that the final results would not differ in any significant or fundamental degree. Incidentally, Panum (45f) recorded that, although syphilis had been unknown in the Faroes until 2 years before his observations, he saw 20 cases of this disease, all of which were of the " simple type."

In evaluating data bearing on " virgin " populations exposed for the first time to a contagious or other type of disease, one must take into consideration such factors as: (1) the attitude of natives toward the disease (malignant spell, witchcraft, and the like), for this factor may explain the refusal of natives to heed the white man's medical advice and the failure to accept his food amid an atmosphere of suspicion and hysteria; (2) the facilities available for treatment; (3) the climate (occurrence of rain) and conditions of the food supply, for these factors may explain the high incidence of such complications as dysentery and pneumonia; (4) prevalence of other diseases at the same time, for example, influenza; (5) the proportion of adults to children, for even in previously exposed populations, contagious diseases are often more severe in adults than in children. It may be noted that a similar view has been held regarding the malignancy of syphilis in Europe at the end of the fifteenth century, but there is considerable evidence to indicate

that this view embraces a large element of exaggeration. In any event, it behooves the proponents of this theory to consider all the circumstances surrounding the alleged greater severity of a "new" disease.

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SMALLPOX AND THE INDIANS IN THE AMERICAN COLONIES

JOHN DUFFY

Romanticized versions of the conquest of North America—for conquest it was—emphasize the heroic battles and perennial warfare of the frontier. The picture of pioneers in their log cabins warding off Indian attacks, or of small garrisons grimly defending themselves from hordes of savages is a familiar one to all Americans. And certainly such scenes were characteristic of the frontier. Yet the extirpation of the Indians was far more the result of the white man's diseases than his weapons. Once the Europeans gained a foothold, their advance guards of disease bore the brunt of the attack and carried death and devastation on an unprecedented scale far into the Indian territory. Historians of the Indian frontier have long been aware that smallpox and other contagions played a significant role in white-Indian relations in North America, but other than noting the fact, little has been written about it.[1]

Prior to the advent of the whites, North America was little troubled with contagious infections. In contrast to the many complaints of sickness and death which characterized the later seventeenth and eighteenth centuries, early explorers and traders universally commented on the salubrity of the climate and the good health of the Indians. For example, Captain Bartholomew Gosnold, who explored the New England coast in 1602 and named Martha's Vineyard, found "the people of a perfect constitution of body, active, strong healthful, and very witty. . . . For ourselves, we found ourselves rather increased in health and strength than otherwise; for all our toyle, bad dyet and lodging; yet no one of us was touched with any sickness."[2] The absence of diseases was also noticed by the early settlers in New England, one of whom wrote in 1633: "Heare I find three great blessings, peace, plenty and health in a Comfortable measure the place well agreeth with our English bodies that they were never so healthy in their native Contrey generally all heare, as never could

[1] William C. Macleod in his *American Indian Frontier* (New York, 1928) briefly mentions smallpox, but devotes much of his attention to venereal disorders. P. M. Ashburn, *The Ranks of Death* (New York, 1947), a first-rate work, deals only cursorily with smallpox. The best short general study of the subject is *The Effect of Smallpox on the Destiny of the Amerindian* (Boston, 1945) by E. W. and Allen E. Stearn which surveys the period from 1492 to the end of the nineteenth century.

[2] P. M. Ashburn, *The Ranks of Death* (New York, 1947), p. 16.

be rid of the head ach, tooth ach, Cough and the like are now better and freer (?) heare and those that were weake are now well long since and I can heare of but two weake in all the plantation Gods name be praised." [3] Little doubt exists that the Indians were relatively free from most of the contagions prevalent in Europe. Smallpox and measles, for example, were certainly absent, and in all likelihood, malaria, yellow fever, typhoid, typhus, and the venereal diseases were among those introduced from the Old World. These infections exacted a heavy toll even among Europeans who had acquired some tolerance to them, but their impact upon the Indians was a major tragedy.

Lest the foregoing present too cheerful a view of health conditions among the early settlers, it must be remembered that in the seventeenth and eighteenth centuries life was short, and sickness and death were omnipresent. Major epidemics swept through Europe with fearful regularity, and endemic disorders steadily winnowed the population. Removal to the New World brought no relief, for contagious sicknesses migrated with the first settlers. And as the wealth and resources of America offered unlimited opportunity for the whites, so their infections found a virgin field in the native population. By way of retribution, the disorders, after ravaging the Indian tribes, occasionally returned with renewed virulence to plague the settlers. However, this danger was relatively minor in relation to the other problems besetting those emigrating to the New World. In the first place, the passage to the colonies, which was made in small overcrowded vessels, ordinarily took from eight to fourteen weeks. Food, on the long voyage, was both scant and dietetically unsound, and sanitation was either neglected or rudimentary. On arrival in the colonies, at least during the first years of colonization, the settlers found a continuation of poor food and inadequate housing. It was small wonder that sickness and disease were a more serious threat to the colonists than the Indians. However, epidemic sicknesses were a familiar evil to Europeans, who looked upon them as the inexplicable instruments of a Divine Providence, whereas for the Indians, they were a new and terrifying experience.

The Spaniards in the sixteenth century were the first to benefit from the services of contagious infections which they, unwittingly, turned loose upon the Indian tribes. Their chroniclers were amazed and, in the case of the Jesuits, shocked at the tremendous casualties which these epidemic diseases inflicted upon the Indians. Certainly such an attitude was justi-

[3] Master Wells to Family, New England, 1633, Sloane MSS (Library of Congress Transcript), vol. 922, no. 90.

fied since the estimates of smallpox deaths alone in Spanish-America during the colonial period run into the millions. Meanwhile other disorders, too, were exacting a heavy tribute. The courage and determination of the small bands of Spaniards who pushed on into vast, unknown, and populous lands cannot be gainsaid, but the glorious victories attributed to Spanish arms would not have been possible without the devastation wrought by Spanish diseases. Spanish arms performed a notable feat; but it was their most potent weapon, sickness, which made the Spanish-American Empire, and later, as an ally of the English and French, was to subdue the Indians in North America.

In contrast to the Spanish missionaries, who worried over the fact that conversion to Christianity so often proved a death warrant to the natives, and that sickness and death were too frequently the result of missionary endeavors, the English in North America during the seventeenth century openly rejoiced when the Lord sent his "Avenging Angels" to destroy the heathen. The American frontier conception that the only good Indian was a dead one characterized relations between the whites and Indians in British North America from the beginning of colonial times. Increase Mather records that when the colonists prayed the Lord to destroy the Indians, an answer was prompt in forthcoming, "For it is known that the Indians were distressed with famine, multitudes of them perishing for want of bread; and the Lord sent Sicknesses amongst them, that Travellers have seen many dead Indians up and down in the woods that were by famine and sickness brought unto that untimely end. Yea the Indians themselves have testified, that more amongst them have been cut off by the sword of the Lord in these respects than by the sword of the English."[4] A missionary to New York wrote home in 1705, ". . . the English here are a very thriving growing people, and ye Indians quite otherwise, they wast away & have done ever since our first arrival amongst them (as they themselves say) like Snow agt. ye Sun, So that very probably forty years hence there will scarce be an Indian seen in our America. God's Providence in this matter seems very wonderful, & no cause of their Decrease visible unless their drinking Rum, with some new Distempers we have brought amongst them."[5]

[4] Increase Mather, "An Historical Discourse Concerning the Prevalency of Prayer," in *A Relation of the Troubles Which Have Happened in New-England by Reason of the Indians there, from the Year 1614 to the Year 1675, etc.* (Boston, John Foster, 1677), p. 6.

[5] Mr. Moor to the Secretary, New York, November 13, 1705, in the Society for the Propagation of the Gospel in Foreign Parts MSS (Library of Congress Photo.), London Letters, A 2, fpp. 272-78 (hereinafter cited as S. P. G.).

Of the many contagious sicknesses which the Europeans brought to plague the Indians, smallpox was far the most deadly. Although the disease is now largely a thing of the past in the more advanced countries, it was one of the leading causes of death in seventeenth and eighteenth century Europe. For example, the London Bills of Mortality from 1731 to 1765 attribute nine per cent of all fatalities to this infection.[6] In the American colonies, too, smallpox was a major threat, but here it more than compensated for any damages inflicted upon the settlers by its ravages among the Indians. A loathsome and exceedingly fatal sickness, smallpox found in the vulnerable Red Men a fertile field for conquest. Unable to comprehend the nature of this unseen foe, the Indians first died in droves huddled in their camps. Later, when bitter experience had made them wiser, they fled in terror at its approach. The infection menaced both whites and Indians throughout the colonial period; it played a part in all colonial wars, fighting sometimes for the French, sometimes for the British, but in all cases warring against the Indians.

The Pilgrims, who first settled New England, entered that region in the wake of a major epidemic which, some three years earlier, had devastated the New England tribes to such an extent that they were unable to make even a token resistance to white occupation. The disorder which smoothed the path for these settlers was undoubtedly of European origin, but its exact nature is still in dispute among medical historians. Smallpox or bubonic plague are the two most likely suspects, but the evidence is inconclusive.[7] No doubt exists, however, about the smallpox outbreak which occurred in New England in 1633. Increase Mather explains that "the Indians began to be quarrelsome touching the Bounds of the Land which they had sold to the English, but God ended the Controversy by sending the Smallpox amongst the Indians of Saugust who were before that time exceeding numerous. Whole Towns of them were swept away, in some not so much as one soul escaping the Destruction."[8] Another colonial writer declares: "This contagious Disease was so noisome & terrible to these naked Indians, that they in many Places, left their Dead

[6] *Gentlemen's Magazine*, 1731-1765, volumes 1 to 35. See also John Duffy, *A History of Epidemics in the American Colonies*, doctoral dissertation, University of California at Los Angeles.

[7] The best study of this outbreak is Herbert U. Williams, "Epidemic among Indians, 1616-1620," *Johns Hopkins Hospital Bulletin*, XX, no. 224 (1909), pp. 340-49. Williams believes the infection was bubonic plague, but there is no agreement among the medical historians.

[8] Increase Mather, *A Relation of the Troubles*, etc., p. 23.

unburied, as appeared by the multitude of the bones up & down the countries where had been the greatest Numbers of them." [9]

By 1634 the infection had spread to the Narragansetts and the Connecticuts with similarly disastrous results. William Bradford asserts that in this year the Indians near the Connecticut River " fell sick of the small poxe, and dyed most miserably; for a sorer disease cannot befall them; they fear it worse than the plague; for usually they that have this disease have them in abundance . . . they dye like rotten sheep. . . . But by the marvelous goodness and providens of God not one of the English was so much as sicke, or in the least measure tainted with this disease." [10] In all likelihood previous exposure had made the English immune to the sickness, but to contemporary observers it seemed a miraculous preservation.

It is more than a coincidence that the Jesuits in Canada reported outbreaks of smallpox among the Indians in the same year that the infection was plaguing the tribes in the Connecticut valley. The river provided one of the easier routes to the St. Lawrence and the series of epidemics which flared up in the Great Lakes and St. Lawrence region from 1634 to 1641 were undoubtedly a continuation of the New England epidemic. The Montagnais around the St. Lawrence were infected in 1634, and the disorder soon was passed on to the other tribes.[11]

The Hurons, who lived north of Lake Ontario, were particularly hard hit in 1636 as indicated by the following graphic description:

> Terror was universal. The contagion increased as autumn advanced; and when winter came, far from ceasing as the priests had hoped, its ravages were appalling. The season of the Huron festivity was turned to a season of mourning; and such was the despondency and dismay, that suicides became frequent. The Jesuits singly or in pairs, journeyed in the depth of winter from village to village, ministering to the sick, and seeking to commend their religious teaching by their efforts to relieve bodily distress. . . . No house was left unvisited. As the missionary, physician at once to body and soul, entered one of these smoky dens, he saw the inmates, their heads muffled in their robes of skins, seated around the fires in silent dejection. Everywhere was heard the wail of the sick and dying children; and on or under the platforms at the sides of the house crouched squalid men and women, in all stages of the distemper.[12]

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[9] *Notebook*, Ebenezer Hazard MSS, Library of Congress.

[10] J. Franklin Jameson, ed., *Bradford's History of Plymouth Plantation, 1606-1646, Original Narratives of Early American History*, American Historical Association (New York, 1908), pp. 312-313.

[11] John J. Heagerty, *Four Centuries of Medical History in Canada* (Toronto, 1928), I, 20.

[12] Francis Parkman, *The Jesuits in North America in the Seventeenth Century* (Boston, 1888), p. 87.

Despite their ardent labors on behalf of the sick, the Jesuits found themselves objects of suspicion to the natives. Father Le Jeune reported: "They (the Indians) observed with some sort of reason that since our arrival in these lands those who had been the nearest to us had happened to be the most ruined by the disease, and that whole villages of those who had received us now appeared utterly exterminated." [13] Further along in his journal he noted sorrowfully that "it has happened very often, and has been remarked more than a hundred times, that where we were most welcome, where we baptized most people, there it was in fact where they died the most." [14] Le Jeune, like the other missionaries of his time, did not realize that although the Europeans had acquired some immunity to the infection, their ministrations to the sick and dying served to make them carriers of the disease.

Smallpox again returned to New England in 1638 and inflicted some casualties upon the English.[15] The following year a group of the Indians contracted the disease while trading with the Abenakis tribe of Maine who had probably acquired it from the New England settlers.[16] Subsequently a major outbreak developed which lasted well into 1640.

Little further is heard of the disease until the 1660's, when it exacted a heavy toll.[17] It struck the Iroquois in 1662-63 and evoked the following notation: "The small-pox, which is the American's pest, has wrought sad havoc in their villages and has carried off many men, besides great numbers of women and children; and as a result their villages are nearly deserted, and their fields are only half-tilled." [18] The disorder soon spread to the Indians in Canada, where it remained for several years.[19] A particularly virulent form of the contagion inflicted heavy casualties among the colonists in New England in 1666. According to one medical writer,

[13] Heagerty, *op. cit.*, I, 22.

[14] *Ibid.*, p. 23.

[15] Noah Webster, *A Brief History of Epidemic and Pestilential Diseases, etc.* (Hartford, Connecticut, 1799), I, 185.

[16] Reuben G. Thwaites, ed., *Jesuit Relations and Allied Documents* (Cleveland, 1896-1901), XVI, 101 (hereinafter cited as *Jesuit Relations*).

[17] The Stearns list an epidemic in Quebec in 1649 following an attack by an English expeditionary force. Their source is Chevalier de Callieres' report to M. de Seignelay, dated 1649, in E. B. O'Callaghan, ed., *Documents Relative to the Colonial History of the State of New York Procured in Holland, England, and France* (Albany, New York, 1856-1861), IX, 492 (hereinafter cited as *Doc. Rel. to Col. Hist. of N. Y.*). However, since the date 1689 appears in the content and reference is made to Count de Frontenac, this outbreak is undoubtedly the one which occurred in 1690. The date 1649 is probably a typographical transposition of 1694.

[18] Heagerty, *op. cit.*, I, 27.

[19] *Ibid.*

the infection was imported by sea,[20] but the prevalence of the sickness among the French and Indians during the preceding years makes the Indians a more likely source. As has been pointed out earlier, a mild type of the infection among the whites often gained in virulence when passed on to the Indians, and was then returned to the colonists in a more malignant form.

During the early years of the seventeenth century, nearly all evidence of smallpox among the Indian tribes relates to the northern regions. The first recorded epidemic in the southern colonies occurred in 1667, when a sailor, infected with the disease, landed in what is now Northampton County, Virginia, and conveyed the disease to some of the local Indians. The usual fatal results ensued, and it was reported that "they died by the hundred . . . in this way practically every tribe fell into the hands of the grim reaper and disappeared, the only exception being the Gengaskins."[21] Little more is heard of smallpox in the southern colonies until the end of the century when the disease once again made a destructive path through the various tribes.

In 1669-70, a severe outbreak affected the Indians in eastern Canada, New England, and upper New York. The Algonquins suffered most, but the Hurons, too, were affected.[22] Seven years later another major epidemic broke out on a wide front. William Hubbard in his narration of the Indian troubles states that "sundry diseases" weakened the Red Men in 1676 at a time when the whites were gradually gaining the upper hand in the bloody Indian struggle known as King Philip's War (1675-77).[23] Whether smallpox was one of these diseases is not known, but the infection did ravage all of New England, affecting both whites and Indians, in the following two years. Incidentally, this outbreak led to the publication of the first medical work in America, a broadside by Thomas Thacher entitled, *A Brief Rule to Guide the Common People of New England how to order themselves and theirs in the Small Pocks, or Measles.*

In addition to ravaging New England, smallpox caused a few deaths

[20] Francis R. Packard, *History of Medicine in the United States* (New York, 1931), I, 75.

[21] Thomas B. Robertson, "An Indian King's Will," *Virginia Magazine of History and Biography*, XXXVI (1928), 192-93.

[22] *Jesuit Relations*, LIII, 59 ff.

[23] William Hubbard, *A Narrative of the Troubles with the Indians in New-England, from the First Planting thereof in the Year 1607, to This Present Year 1677, etc.* (Boston, John Foster, 1677), p. 95.

among the Indians in the Great Lakes area,[24] and, according to the diary of Increase Mather, "destroyed a great part of the Indians of Delaware Bay." [25]

Next year, 1679, the Iroquois were decimated by the pestilence. Count de Frontenac declared of the Iroquois "that the Small Pox, which is the Indian Plague, desolates them to such a degree that they think no longer of Meeting nor of Wars, but only of bewailing the dead, of whom there is already an immense number." [26] Three years later the disease struck the Indians at the Jesuit mission of Sillery near Quebec.[27] However, the outbreak was localized, and the disease apparently subsided in North America for a brief period.

The years 1688 to 1691 saw smallpox prevailing extensively among both Indians and whites, French and British. Whether the disease originated in the French or English settlements is not clear; possibly both regions may have been infected independently. In any case, the hostilities of King William's War broadcast the smallpox virus far and wide. Both sides suffered heavy casualties from the contagion since smallpox showed no partiality when Europeans fought each other. In fact, on more than one occasion well-planned military campaigns were thwarted by this unseen enemy. In 1690, the English, allied with the Mohegans and Iroquois, planned an assault on Quebec, but were foiled by an outbreak of smallpox. When British and Mohegan emissaries, still bearing the marks of the pestilence, were sent to the Iroquois, they were accused of bringing the plague. Subsequently the Iroquois became contaminated, about 300 died, and the rest refused to join the expedition.[28] Father Michael DeCourvert reported to Count de Frontenac from Quebec in 1690, "A malady which was prevalent among the English having communicated itself to the Loups, and some of them having died, the Loups laid the blame upon the English." [29] As a result the English abandoned the campaign. The next year, 1691, Father Millet, another Jesuit, stated specifically that the

[24] *Jesuit Relations*, LXIII, 205.

[25] Samuel A. Green, ed., *Diary by Increase Mather, March, 1675—December, 1676, Together with Extracts from Another Diary by Him, 1674-1687* (Cambridge, Massachusetts, 1900), pp. 20-21.

[26] Count de Frontenac to the King, Quebec, November 6, 1679, in *Doc. Rel. to Col. Hist. of N. Y.*, IX, 129.

[27] *Jesuit Relations*, LXII, 145.

[28] Count de Frontenac to Minister, December 12, 1690, in *Doc. Rel. to Col. Hist. of N. Y.*, IX, 460-61.

[29] Father Michael DeCourvert to Count de Frontenac, Quebec, 1690, in *Jesuit Relations*, LXIV, 47.

British had sent two armies against Quebec, adding that "smallpox stopped the first completely, and also scattered the second." [30]

Meanwhile the disease continued to rage among the Indians and whites in New York province. Major General Winthrop, in his journal of marches in the vicinity of Albany, New York, during these years often mentions the presence of smallpox among the troops and in the towns through which they passed.[31] As usual, the Indians were the chief sufferers. Robert Livingston reported the deaths of an entire group of Dovaganhae Indians who had come to Albany to trade in 1691.[32] In short, whether engaged in trade or in warfare, the Indian susceptibility to smallpox steadily reduced their numbers.

The southern provinces were the next to bear the brunt of smallpox attacks. An outbreak began in Jamestown, Virginia, in 1696 and gradually spread into the Carolinas, where it brought many fatalities to the whites, and even more to the Indians. One tribe, probably the Pemlico Indians, was almost completely destroyed. A correspondent from South Carolina reported in 1699 that smallpox was "said to have swept away a whole neighboring (Indian) nation, all to 5 or 6 which ran away and left their dead unburied, lying upon the ground for the vultures to devour." [33] The extermination of this tribe was described in 1707 by John Archdale, whose account subsequently was copied by John Oldmixon and many other eighteenth century writers.[34] The infection probably spread as far west as the Lower Mississippi valley for the tribes here were attacked at this time.[35]

The eighteenth century saw the decimation of the American Indian continue at an accelerated speed. Smallpox, which first became a serious problem in England and on the Continent around the time of the Stuart

[30] "Letter of Father Millet," 1691, in *Jesuit Relations*, LXIV, 97-99. Millet probably had in mind the two expeditions sent against Quebec in 1690: The New England and New York troops based at Albany attacked by land, and a naval force under the direction of Sir William Phips by sea.

[31] "Journal of Major General Winthrop's March from Albany to Wood Creek, July to September, 1690," *Doc. Rel. to Col. Hist. of N. Y.*, IV, 193-96.

[32] Letter from Robert Livingston, Albany, New York, June 4, 1691, in *ibid.*, III, 778.

[33] Mrs. Afra Coming to sister, March 6, 1699, quoted in Edward McCrady, *The History of South Carolina under the Proprietary Government*, 1670-1719 (New York, 1897), p. 308.

[34] John Archdale, *A New Description of that Fertile and Pleasant Province of Carolina* (London, 1707), in Bartholomew R. Carroll, *Historical Collections of South Carolina* (New York, 1836), II, 462-535. The account by John Oldmixon in his *British Empire in America* is identical with Archdale's.

[35] Stearn and Stearn, *op. cit.*, p. 33.

Restoration, grew steadily worse during the eighteenth century, tapering off only slightly during the last twenty years. The same held true in the American colonies although here the widespread use of variolation, or inoculation with smallpox, among the settlers greatly reduced the smallpox hazard by the 1760's.[36] For the Indians, however, there was no relief, and the higher incidence of the disease among the whites during the first half of the eighteenth century brought only further suffering and death to the Red Men.

In 1702 a mild form of smallpox was prevalent among the colonists in New York province. Governor Cornbury reported that the infection had been carried to the River Indians.[37] As so often happened, the disease spread north via the Indians and soon reached the town of Quebec which endured one of its most severe epidemics in the winter of 1702-1703. Heagerty estimates about 3,000 deaths from the contagion in Quebec alone.[38] Quite possibly the disease, which was relatively mild in New York, gained virulence as it progressed through the Indian tribes. Little evidence exists of its effect upon the Indians, but it doubtless took a heavy toll.

From 1703 to 1715 the English colonies gained relief from smallpox; but in the latter year it broke out anew and was to ravage all sections during the next seven years. The first reports of the sickness came from New Jersey in 1715.[39] By the following year, it was general throughout New York province. A missionary for the Society for the Propagation of the Gospel, a Church of England missionary society, wrote in October, 1716, " The Small Pox has been much among ye Indians here this last Summer & swept off a great many of ym & now it is got among ye other Nations beyond us, & Die as many there with it." [40] The disease continued to plague the Indians throughout 1716 and 1717, with few of the tribes in the Northwest escaping it.

In June, 1717, Governor Hunter of New York held a conference with the representatives of the Five Nations at Albany. In his opening address, he expressed sympathy " for the loss that has happened by the Small Pox

[36] Duffy, *op. cit.*; see chapter on variolation.

[37] Lord Cornbury to the Lords of Trade, New York, June 30, 1703, in *Doc. Rel. to Col. Hist. of N. Y.*, IV, 996-97.

[38] Heagerty, *op. cit.*, I, 67-68.

[39] Rowland Ellis to the Secretary, New Jersey, 1715, in S. P. G. MSS (L. C. Photo.), New York Letters, A 12, fp. 165.

[40] William Andrews to the Secretary, Fort by Mohawk Castle, October 11, 1716, in S. P. G. MSS (L. C. Photo.), London Letters, A 12, fp, 136.

to the bretheren, or any of your friends and allies." He pointed out, ". . . but we Christians look upon that disease and others of that kind as punishments for our misdeeds and sin, such as breaking of covenants & promises, murders, and robbery, and the like." [41] The Indians were not overly impressed and replied that they intended to dispatch someone to "Canistoge, Virginy, or Maryland" to find out who had been sending the contagion and to prevent them from so doing.[42] A French official who recorded the results of a meeting between the French and the Indians in October mentioned that the Iroquois were afflicted with the disease.[43]

The culmination of this widespread outbreak was an attack on Boston in 1721, which brought sickness to 60 per cent of the population and caused almost 900 deaths.[44] Following the Boston epidemic, the disease subsided for about nine years. In 1730, this city was again the scene of a major epidemic. On this occasion, some 4,000 cases developed and the death toll was approximately 500.[45] Neighboring towns such as Medfield and Cambridge reported additional cases, and a correspondent from Chatham noted that the disease was among the Indians, of whom, he said, "not so much as one has yet escaped." [46] The following spring the infection was reported among the Dutch around Albany and Schenectady, from whence it soon spread to the Indians in Eastern Canada.[47] By fall, the Senecas and other Iroquois tribes were victimized.[48] The infection continued to rage among the Indians in Canada throughout the winter, inflicting severe casualties. One tribe, the "Sounontonans," lost half their number.[49] Fear of the disorder in Canada drove many of the Indians into British territory, where they alarmed the frontier settlements.[50]

Meanwhile the tribes to the south of the Great Lakes-St. Lawrence

[41] Governor Hunter's Reply to the Five Nations at the Conference at Albany, New York, June 13, 1717, reported by Robert Livingston, Secretary of Indian Affairs, in *Doc. Rel. to Col. Hist. of N. Y.*, V, 485-86.

[42] Indian Reply to Governor Hunter, New York, June 13, 1717, in *ibid.*, p. 487.

[43] M. de Vaudreuil's Conference with Indians, October 24, 1717, in *Doc. Rel. to Col. Hist. of N. Y.*, IX, 877.

[44] See Duffy, *op. cit.*, p. 48 *passim*.

[45] William Douglass, *A Summary, Historical and Political, of the First Planting, Progressive Improvements, and Present State of the British Settlements in North America* (London, 1760), II, 396-397.

[46] Boston *Weekly Newsletter* (L. C. Photo), no. 1400, November 19-26, 1730.

[47] New York *Gazette* (L. C. Photo.), no. 248, March 26—April 5, 1731.

[48] M. de Beauharnois to Count de Maurepas, October 15, 1732, in *Doc. Rel. to Col. Hist. of N. Y.*, IX, 1035-1037.

[49] Heagerty, *op. cit.*, p. 35.

[50] *Belcher Papers*, Massachusetts Historical Society *Collections*, ser. 6, VI, 367.

region, too, paid toll to this grim pestilence. In September, Governor William Cosby of New York offered condolences to the Five Nations for the "great mortality among you by the small pox." [51] No statistics are available as to the number of cases or deaths in the various tribes, but the Indian susceptibility to the infection coupled with its widespread distribution must have produced some grim results.

The year, 1738, saw Charleston the victim of a major smallpox outbreak which sickened almost half the population. The neighboring Cherokee Indians, to whom the disease was carried, were devastated, losing fifty per cent of their members. Unable to explain this catastrophe, the Indians accused the English of poisoning them and threatened to trade with the French; this latter contingency was avoided only by careful diplomacy.[52] The Cherokees were estimated to have about 6,000 warriors prior to 1738 when the number was cut in half. Alexander Hewat, an eighteenth-century South Carolina historian, blamed smallpox for much of the decline in Indian population and asserted that by 1765 the Cherokees were reduced to less than 2,000 warriors.[53] In this same year, 1738, smallpox was transmitted to the Indians in the Hudson Bay region and spread widely in northern Canada.[54]

During the winter of 1746-47 the infection was again present in New York province and spread both north and south in the ensuing year. The governor of Canada was obliged to dispatch a message of condolence to the Onondagas for their sufferings from smallpox during the preceding winter.[55] In the American colonies, Maryland and Delaware were infected with the disease, but there is little evidence of it among the Indians. However, John Brainerd, a missionary in New Jersey, later spoke of a "Mortal Sickness," which may have been smallpox, carrying off many Indians in 1747.[56]

[51] *Doc. Rel. to Col. Hist. of N. Y.*, V, 963.

[52] "A Treaty Between Virginia and the Catawbas and Cherokees, 1756," *Virginia Magazine of History and Biography*, XIII (January, 1906), 227 fn.; see also Newton D. Mereness, *Travels in the American Colonies* (New York, 1916), p. 239. Captain James Oglethorpe met a delegation of Indians in September, 1739, and managed to allay their suspicions of the English.

[53] Alexander Hewat, *An Historical Account of the Rise and Progress of the Colonies of South Carolina and Georgia* (London, 1779), II, 279-80.

[54] Heagerty, *op. cit.*, I, 36-37.

[55] Colonel William Johnson to Governor Clinton, May 7, 1747, *Doc. Rel. to Col. Hist. of N. Y.*, VI, 362.

[56] John Brainerd to Mrs. Smith, Brotherton, New Jersey, August 24, 1761, in Simon Gratz Collection, Pennsylvania Historical Society MSS, American Clergymen.

The next smallpox epidemic among the Indians occurred in the Great Lakes region in 1752. The Miami tribe, to whom the French were looking for help, was completely routed by the infection. The French post at Detroit was attacked also, and one contemporary observer asserted that the sickness was "ravaging the whole of that Continent." [57] However, the Ohio valley and the areas to the East remained unaffected. Boston suffered a large scale outbreak in 1751, but the disease was sea-borne and does not seem to have spread beyond the city.

Three years later, 1755, the sickness reappeared. This time, contrary to its usual course, it began in Canada and then moved south into New York. Heagerty asserts that Canadians for years afterwards referred to 1755 as the year of the great smallpox epidemic, and that all activities, even the perennial warfare, ceased.[58] This disastrous plague in Canada did not wear itself out until late in 1757 after having swept through both French and Indian settlements. The epidemic first ravaged the French settlers and then spread to the Indian tribes. The Senecas were attacked in 1755 [59] and by the following spring nearly all of the Indians in Eastern Canada and the New England region were affected. In June, 1756, a French dispatch from Canada stated that the Indians on the borders of Acadia and New England were still hostile to the English, adding, however, ". . . unfortunately, they have not as yet been able to go on the war path, having been afflicted by the smallpox in all their villages." [60] Two months later a French official wrote of his difficulty in marshalling the Indians against the English because of their fears of the infection "at Niagara, Prequ'Isle and Fort Duquesne." [61]

The English settlements and the Indians to the south also were victimized in 1756. A report from Virginia stated that the contagion was raging among the Delawares who had caught the infection "in some Scalps they carried off from a place 20 miles above Bethlehem." [62] Meanwhile the infection manifested itself in the British armies, occasioning much alarm. The appearance of the disease in Albany, according to one writer, frightened the provincial troops more than the presence of Montcalm himself could have done, and made it necessary to garrison the town

[57] M. de Longueil to M. de Rouille, April 21, 1752, in *Doc. Rel. to Col. Hist. of N. Y.*, X, 246-50.
[58] Heagerty, *op. cit.*, I, 39-40.
[59] *Doc. Rel. to Col. Hist. of N. Y.*, X, 345.
[60] *Ibid.*, X, 408.
[61] *Ibid.*, X, 435-38; VII, 240.
[62] Boston *Weekly News-Letter* (L. C. Photo.), no. 2815, June 17, 1756.

entirely with British troops and to discharge all colonial soldiers there except one regiment raised in New York.[63]

Smallpox continued to flare up sporadically in most of the Middle colonies during 1757, and, as was usually the case, among the adjacent Indian tribes. A report to the French government in July asserted that the disorder was plaguing the English at Forts George and Lidius [Edward].[64] A month or two earlier a conference between the Indians and the English at Philadelphia had been disrupted when a number of the Indian representatives fell victim to smallpox. Soon the infection spread to the other Indians, who decided to return home immediately.[65] Subsequently the Governor's Council in Pennsylvania granted presents and extended condolences to the Indians for their heavy losses from the disease.[66]

In April, 1758, General Montcalm reported that a number of the Upper Country Indians were dying from smallpox "caught from the English on the expedition against Fort William Henry."[67] On this occasion, the garrison, hit hard by smallpox, surrendered to the French and their Indian allies. As was often the case, the Indians got out of control, murdered the sick, and in their quest for scalps, even dug up the bodies of those who had died.[68] Retribution was swift and severe for the Pandora's box, once opened, brought them far more death and suffering than they had inflicted upon the whites. In the long struggle between the Red Men and the colonists, the Indians, unfortunately, won far too many of these Pyrrhic victories.

The year 1758 again saw smallpox widespread in the provinces of New York and New Jersey. In December an S. P. G. minister wrote that the disease had "made dreadful havock . . . among thousands of white people and Indians when taken in the natural way."[69] His reference to "taken in the natural way" was to differentiate from smallpox inoculation which was then coming into general use. As a matter of fact, it was the indis-

[63] John Marshall, *A History of the Colonies Planted by the English on the Continent of North America* (Philadelphia, 1824), pp. 303-304.

[64] M. de Vaudreuil to M. de Moras, Montreal, July 12, 1757, in *Doc. Rel to Col. Hist. of N. Y.*, X, 579-580.

[65] Report of the Conferences with the Indians at Philadelphia, April 4, 1757, in *Minutes of the Provincial Council for Pennsylvania, Colonial Records*, VII, 517.

[66] "Minutes of the Council at Lancaster," May 21, 1757, in *ibid.*, p. 546.

[67] M. de Montcalm to M. de Paulmy, Montreal, April 18, 1758, in *Doc. Rel. to Col. Hist. of N. Y.*, X, 698-700.

[68] Francis Parkman, *Montcalm and Wolfe* (Boston, 1886), 11, 5.

[69] Colin Campbell to the Secretary, Burlington, New Jersey, December 20, 1759, in S. P. G. MSS (L. C. Photo.), London Letters, B 24, fpp. 151-153.

criminate use of variolation which not infrequently served to disseminate the infection among the settlers. The next section to feel the weight of smallpox was the southern colonies where the Indians in Georgia and South Carolina were devastated by the infection in 1759-60. The first notice of the outbreak occurred in a report from Georgia published in August, 1759, which stated that Savannah was exercising all precautions against the introduction of the disease; that Augusta was free of it; and that it had almost disappeared from among the Chickasaws [70] On December 15, the *South Carolina Gazette* commented editorially: "It is pretty certain that the Smallpox has lately raged with great Violence among the Catawba Indians, and that it has carried off near one-half of that nation, *by throwing themselves into the River*, as soon as they found themselves ill—This Distemper has since appeared amongst the Inhabitants of the *Charraws* and *Waterees*, where Many Families are down; so that unless special care is taken, it must soon [spread] thro' the whole country." [71] Over a month later a correspondent in Augusta wrote: "The late Accounts from Keowee are, that the Small-Pox has destroyed a great many of the Indians there; that those who remained alive, and have not yet had that Distemper, were gone into the Woods, where many of them must perish as the Catawbas did." [72] During the ensuing months smallpox continued its inexorable progress through the Indian tribes. On August 13, 1760, a *Pennsylvania Gazette's* correspondent reported from Augusta: "We learn from the Cherokee country, that the People of the Lower Towns have carried smallpox into the Middle Settlement and Valley, where that disease rages with great violence, and that the People of the Upper Towns are in such Dread of the Infection, that they will not allow a single Person from the above named Places to come amongst them." [73] In October the Gazette noted that the "Cherokees had brought the Small-Pox into the Upper Creek Nation." [74]

To add to the Indian troubles, Governor Henry Lyttleton of South Carolina led an expedition against the Cherokees in 1759 which resulted in the Treaty of Fort St. George late in the fall. As the treaty was signed, smallpox, which had been raging in a nearby Indian village, broke out in the Governor's camp. The effect produced by the appearance of this dreaded plague among the colonial expeditionary force has been vividly

[70] Boston *News-Letter* (L. C. Photo.), no. 3021, August 2, 1759.
[71] *South Carolina Gazette*, no. 1321, December 15, 1759.
[72] *Pennsylvania Gazette*, no. 1625, February 14, 1760.
[73] *Ibid.*, no. 1654, September 4, 1760.
[74] *Ibid.*, no. 1662, October 30, 1760.

described by Dr. Alexander Hewat, a contemporary historian: "As few of his little army had ever gone through that distemper, and as the surgeons were totally unprovided for such an accident, his men were struck with terror, and in great haste returned to the settlements, cautiously avoiding all intercourse with one another, and suffering much from hunger and fatigue by the way." [75] Despite all precautions, returning troops carried the infection into Charleston and the other towns.

Ordinarily the Indians were the chief victims of smallpox, but the South Carolina outbreak was an exception to the general rule. The renewed virulence which often characterized smallpox after it had circulated among the Indian tribes held true of the virus which the Indians communicated to the troops in 1759. During the winter that followed about 75 per cent of Charleston's inhabitants sickened with the infection and the ensuing deaths totaled well over 700.[76] However, many of the smallpox cases resulted from the practice of inoculation, to which the people of Charleston resorted. Augusta and Savannah, too, were infected, and like Charleston, bore heavy casualties. The destruction among the whites was small consolation to the Indians whose already thin ranks were decimated, and who could ill afford such a depletion of manpower in the face of the steadily increasing European settlements. The seriousness of the loss to the Indians is indicated in an article describing the Catawba Indians published in one of the colonial newspapers. The account, written in 1760, declared that seventy years ago the Catawbas were a strong nation with four thousand members, but had been reduced since by "Rum, War and Small-Pox" to less than "100 gunmen." [77] Simultaneously with the major outbreak in South Carolina and Georgia, scattered epidemics occurred all the way to Canada. Hostilities between the English and French widely disseminated the contagion, which seems to have been endemic among the troops. The journals and diaries of soldiers in the field speak constantly of the omnipresent threat from smallpox. And the Indians, either as allies or enemies, were even more susceptible to the disease than the colonial troops. For example, a group of Dakotas, who journeyed to Quebec after its capture by the English, became infected, and the Menominee tribe in Wisconsin was greatly reduced by the ravages

[75] Bartholomew R. Carroll, *Historical Collections of South Carolina* (New York, 1836), I, 452.

[76] *Pennsylvania Gazette*, no. 1633, April 10, 1760; *South Carolina Gazette*, no. 1340, April 19, 1760.

[77] Boston *News-Letter* (L. C. Photo.), no. 2615, June 5, 1760.

of war and smallpox.[78] Sporadic outbreaks continued to develop throughout the war and few sections of British-controlled North America escaped.

The colonists were well aware of the potency of smallpox as a weapon against the Indians, and on several occasions deliberate efforts were made to infect the Red Men. One of these instances occurred during the Pontiac conspiracy in 1763. The British commander, Sir Jeffrey Amherst, added the following postscript to a letter to Colonel Henry Bouquet, "Could it not be contrived to send the small-pox among these disaffected tribes of Indians? We must on this occasion use every strategem in our power to reduce them." Bouquet replied on July 13, 1763, "I will try to inoculate the ----- with some blankets that may fall in their hands, and take care not to get the disease myself."[79] Just how successful Bouquet's experiment was is not known.

In the years 1764-65 smallpox flared up among the Indians in a number of widely separated regions. On July 30, 1764, the New York *Mercury* stated that "Smallpox has gone among the Creek Indians & carried off great Nos. of them."[80] The following spring the *Pennsylvania Gazette* reported that "1,500 Choctaws and 300 Chicksaws had died from the infection."[81] Later in the summer, Cornelius Bennett, an S. P. G. missionary among the Indians in the vicinity of Mohawk Castle, explained to the Society that the danger from smallpox had compelled him to return to Boston.[82] The notorious lack of enthusiasm among these missionaries for working with the Indians may have caused Bennett to overrate the danger; however, he did write the following year that he was ready to return to the mission field, which indicates that his concern over smallpox may have been justified.[83] Meanwhile the contagion was reported to be menacing the "Shawnese."[84] The settlers in Maryland were plagued with the infection in 1765, and Quebec suffered a major outbreak, but apparently these epidemics had little effect upon the Indians.

Smallpox subsided during the rest of the colonial period and did not constitute a serious threat to either the colonists or the Indians until the

[78] Francis Parkman, *History of the Conspiracy of Pontiac and the War of the North American Tribes against the English Colonies after the Conquest of Canada* (Boston, 1851), pp. 318 ff.

[79] Heagerty, *op. cit.*, I, 43.

[80] New York *Mercury* (L. C. Photo.), no. 666, July 30, 1764.

[81] *Pennsylvania Gazette*, no. 1901, May 30, 1765.

[82] Cornelius Bennett to Secretary, Boston, September 12, 1765, in S. P. G. MSS (L. C. Photo.), London Letters, B 22, fpp. 130-131.

[83] *Ibid.*

[84] Heagerty, *op. cit.*, I, 43.

opening hostilities of the Revolutionary War. As in previous wars, the troops carried the virus into all areas, infecting both civilians and Indians alike. By this time smallpox had already contributed much to the reduction of the Indian threat, but its task was still undone. Well into the nineteenth century smallpox continued its grim work of decimating the Indian tribes. In fact, it was not until the beginning of the present century that the infection was finally controlled.

The exact role played by smallpox in the settlement of North America is not easily determined. Certain tribes were literally wiped out, yet others survived many attacks, and were even, in the intervals between outbreaks, able to recoup their losses through a natural population increase. However, by eliminating a number of Indian tribes, smallpox cleared the way for white occupation in some areas with only a minimum of friction. Major epidemics among the surviving Red Men permitted easier advances into Indian territory, and often by the time the tribes had recovered enough to make an effective resistance, the whites were too well entrenched to be driven back. In times of war, smallpox, although a dangerous ally, was frequently a decisive factor in the victories of the Europeans over the Indians. The task of settling the New World was a difficult one at best. The enormous physical job of clearing forests and preparing land for cultivation combined with the constant menace of the Indians, always numerous, shrewd, and skillful adversaries, makes it apparent that the determination and courage of the early settlers has not been exaggerated.

JONATHAN HUTCHINSON AND INTUSSUSCEPTION

MARK M. RAVITCH *

The wide range of Jonathan Hutchinson's interests is obvious to anyone who takes thought of the number and variety of conditions to which his name is given eponymically. The two Hutchinson's diseases, a senile choroiditis and a form of cutaneous sarcoid, Hutchinson's mask (in tabes dorsalis), Hutchinson's patch, on the cornea in syphilitic keratitis, Hutchinson's pupil (unequal in meningeal hemorrhage), Hutchinson's triad, Hutchinson's teeth, Hutchinson's interstitial keratitis, all of these hardly suggest that Hutchinson was a surgeon. In point of fact, of course, although he had a profound interest in diseases of the eye and of the skin, Hutchinson was a busy practicing surgeon, surgeon to the London Hospital and at one time President of the Royal College of Surgeons.

Garrison's (1) comparison of Hutchinson with John Hunter,—"His Archives of Surgery (1889-99) in ten volumes entirely written by himself, forms a great storehouse of original observations on disease, which will some day be studied like the works of John Hunter,"—is of particular interest in connection with the present discussions, for Hunter, like Hutchinson, took a keen interest in intussusception.

Hunter (2) in 1789 described the specimen from a fatal intussusception in a nine month old child. He read his paper before a small group that met monthly at Slaughter's Coffee House in St. Martin's Lane and called themselves "A Society for the Improvement of Medical and Chirurgical Knowledge." This was a select society of twelve members selected from the staff of St. Bartholomew's, St. George's, Guy's, and St. Thomas's. One hundred and eight years later, D'Arcy Power (3) in his fine Hunterian lecture had occasion to refer to Hunter's specimen in the following words, "Some of the later changes in intussusception we illustrate by sections taken from John Hunter's own specimen, which was particularly well preserved, because at the time the patient died, spirit was so cheap and strong that its retailers used to advertise that their customers might be 'drunk for a penny, dead drunk for two pence, and straw to lie upon for nothing.'" Hunter's anatomical observations were accurate but his therapeutic suggestions leave something to be desired.

* From the Department of Surgery of the Johns Hopkins University.

> Everything that can increase the action of the intestines downwards is to be particularly avoided. . . . I should therefore advise giving vomits, with a view to invert the peristaltic motion of the containing gut which will have a tendency to bring the intestines into their natural situation.

Garrison's coupling of the two men suggests a comparison which demonstrates one outstanding difference. Both were great clinicians, observers, and inquirers, but whereas Hunter was a strong exponent of the experimental method, Hutchinson took aggressive pride in being purely a clinical observer. We are accustomed to think that the 19th century was the heyday of the clinical observer in medicine when the laboratory was as yet unassociated with the patient, and medical progress was made chiefly in the wards. But familiar and modern are the laments of Hutchinson, set forth in volume 6 (4) of his *Archives*, over the tendency to exalt the laboratory and ignore the clinics. The article, entitled "A Plea for Clinical Research" was couched in strong, if not wholly accurate terms. He actually decried Garrod's discovery of the relation of "urate of soda in the blood" to gout, and thought Koch's discovery of the tubercle bacillus was a disadvantage. He says:

> The tendency has been to receive with premature confidence every little so called discovery of the chemist or bacteriologist, and to permit them in some instances to supersede, and in others to override the conclusions deducible from common observation. The latter has accordingly been disparaged as a means of arriving at discoveries, and it has not been cultivated with the industry, zeal, and caution which would naturally spring from firmer faith in its methods. Now inasmuch as many of the most important problems of medicine are from their nature but little amenable to the exact methods of scientific investigation, it is surely to be regretted that any slur should be cast upon the only kind of research which is really hopeful.

One can appreciate Hutchinson's obvious fear at being overwhelmed by the laboratory. Hutchinson, as we shall remark again, was the epitome of the master clinician of his day. He showed no awareness of the trends of clinical progress nor of the possibilities for advancement, although in another connection he is critical of Samuel Sharp of Guy's (5) for being so smug about the status of surgical knowledge in his day (1750) when he said, "Perhaps there never was a period of time in which any art was more cultivated than surgery has been for these last thirty years."

On November 11, 1873, Hutchinson read before the Royal Medical and Chirurgical Society his first paper on intussusception (6) reporting a successful operation performed in 1871 on a 2 year old infant referred to him by Warren Tay (the Tay of Tay-Sachs disease). (See fig. 1.) Under chloroform anesthesia, distension of the rectum with warm water failed

to reduce the intussusception. " It was very evident from the child's condition that unless relief were afforded she would not live long, and I therefore felt justified in telling the parents that although an operation would be, in itself, very dangerous, yet I thought it afforded the only chance."

The boldness of this recommendation, based on his previous unhappy experiences with non-operative treatment, which he cites in detail, may be judged by his own appraisal of the status of operative treatment of intussusception at that time. In 1784 an unnamed French surgeon successfully reduced an intussusception diagnosed by Nuck. In 1825 Fuchsius reported another successful case, also in an adult. In 1836 Dr. John R. W. Wilson of Rutherford Co., Tennessee, was reported in the *Transylvania Medical Journal* to have successfully operated on a negro slave five years before. These were the only previously recorded successful cases and it seems more than likely that, erudite though Hutchinson was, he must have learned of them only in preparing to report his own operation. Only one such operation had been attempted in England,—by Spencer Wells, in an infant who died. Pirogoff, the Russian who is famed chiefly as a military surgeon, and a few others, had also reported operative failures.

Hutchinson's operation, performed under chloroform anesthesia, through a lower mid line incision, proved quite easy. " Having completed the reduction (by ' drawing the intussuscepted part out of that into which it had passed ') I put the bowel back into the abdomen, and closed the wound with harelip pins and interrupted sutures." " The operation," he said, " had been an extremely simple one, and had not occupied more than two or three minutes."

He reviewed not only the history of the operative results but also all the reported cases of intussusceptions reaching the left colon. For the lengthy tables listing these cases, he acknowledged his debt to Tay, who had prepared them.

The varying clinical course of patients with intussusception attracted his attention and he emphasized the favorable nature of the non-strangulating intussusceptions of long duration. Since intestinal suture had not much chance of success at that time, he thought it important not to operate if gangrene were suspected since in that case the patient's only hope lay in sphacelation of the intussusception with spontaneous separation and passage of the sloughed intussusceptum per rectum.

From his experience and his study of the literature he drew 20 formal conclusions, of which numbers 18 and 19 are interesting in the light of

A SUCCESSFUL CASE

OF

ABDOMINAL SECTION FOR INTUSSUSCEPTION;

WITH REMARKS ON THIS AND OTHER METHODS OF TREATMENT.

BY

JONATHAN HUTCHINSON, F.R.C.S.,

SENIOR SURGEON TO THE LONDON HOSPITAL; SURGEON TO MOORFIELDS OPHTHALMIC HOSPITAL AND TO THE HOSPITAL FOR SKIN DISEASES.

Received October 21st—Read November 11th, 1873.

THE case of intussusception which I am about to describe came under my care at the London Hospital in 1871.

The patient was a somewhat delicate female child aged two years. She had previously been seen by my colleague Mr. Waren Tay, who had diagnosed her disease, and by whom she was transferred to my care in order that she might be admitted as an in-patient.

From her anus there protruded a portion of bowel about two inches long, deeply congested and much swollen. By the side of this the finger could be passed, its full length, into the rectum without reaching the point at which the intussusception began. On carefully examining the extremity of the protruded part, I noticed that it did not present merely a rounded opening as usual in such cases. I was able easily to identify the pouch and valve of the cæcum, with the

FIG. 1

Title page of Hutchinson's report of his first successful operation for reduction of intussusception. Performed in 1871, it was the first recorded success in an infant, the first successful operation for intussusception in England, and the fourth in recorded literature. The report appeared in the *Medico Chirurgical Transactions*, vol. 57, 1874, pp. 31-76.

his next reported adventure with intussusception and 20 as illustrative of his inquiring mind and methods of investigation.

18. That in cases of intussusception in young infants (under one year of age) the prognosis is very desperate, scarcely any recovering excepting the few in whom injection treatment is immediately successful, whilst a larger majority die very quickly.

19. That the fact just referred to may be held to justify, in the case of young infants, very early resort to operation.

20 That it is very desirable that all who in the future have the opportunity for post mortem examination of intussusception cases should give special attention to the question as to whether an operation would have been practicable and should record their results.

In 1875, two years after his first account, he reported (7) a second case before the Royal Medical Chirurgical Society of London. On the same night two other successful operations for intussusception were reported. The first case was reported by Howard Marsh, (8) assistant surgeon to St. Bartholomew's and to the Hospital for Sick Children. Marsh's patient was a seven months old male infant with an intussusception of eleven or twelve days duration presenting at the anus. Insufflation and injection under chloroform failed to achieve a reduction. Marsh made a lower mid line incision and delivering the proximal end of the intussusception was able to pull back the proximal loop out of the distal. The child did very well. In his remarks, Marsh said of the earlier paper by Hutchinson, who was present, " Before that communication was read it was the very general opinion that abdominal section ought not to be performed in cases of intussusception, because, among other reasons, the intestine became so damaged by inflammation and strangulation, and so fixed by the mutual adhesion of its different layers, that it could not safely be drawn out. But Mr. Hutchinson directed particular attention to the fact . . . that in many cases the condition of an intussusception is not that of inflammation, strangulation, or adhesion of its layers, but of simple invagination: the volvulus lying loose in its sheath, in a state comparable with that of a portion of intestine prolapsed into a hernial sac." After this bow in Hutchinson's direction however, Marsh went on, " Mr. Hutchinson refers to the effect which the age of the patient is likely to have on the result of the operation; and he remarks that ' in the absence of any data as to the manner in which operations of this kind are borne by very young children, we shall probably be right in believing that they are far less hopeful than in those that are somewhat older.' " Marsh quite properly takes issue with this, saying " the evidence derived

from this case however points the other way, for though the patient was only seven months old, though he was in a condition of collapse at the time of the operation, though the intussusception was very extensive, and though a considerable length of the intestine lay at one time on the surface of the abdomen and was not returned without free handling, yet recovery took place without a bad symptom, and with no more trouble or suffering than usually attends an operation for harelip . . . and the patient was convalescent on the fourth day."

The second case (9) was presented by two Guy's hospital men—C. Hilton Fagge and Henry G. Howse.

They began, "The following case is of interest, as showing the value of abdominal section, or laparotomy, as some recent writers prefer to call it, in those cases of intussusception which inflation has failed to cure." In reporting the successful operation Howse describes his manipulation, "The intestine was accordingly drawn out from the abdominal cavity and . . . even then some difficulty was experienced in reducing it. Pulling at the end was quite ineffectual, though as much force as was considered justifiable was exerted in this way. Under a kind of kneading movement, however, combined with circular pressure upon the farthest intussuscepted part of the gut, it began to yield, and when once started the process went on readily, until the last part of the intestine was reached."

Hutchinson's own report (7) was much briefer than the two which were presented before his at the same session—perhaps because his patient died. However his case served him as a text on the technique of operative reduction of intussusception.

His patient was a six month old male infant, sick for four days, with an intussusception palpable per rectum. Hutchinson met all of the difficulties of the tyro in pediatric surgery faced with intestinal obstruction in a sick infant and one cannot help feeling sorry for him in the difficulties he describes with such painful clarity.

> I found the operation, as perhaps might be expected at so early an age, much more difficult of accomplishment than in my former case, and it is chiefly to these difficulties that I wish to ask the attention of the society.
>
> The abdominal wall was thick . . . and the space between the umbilicus and pubes was very short. . . . I was obliged, therefore, to enlarge the wound freely above the umbilicus, and to allow the intestines, much distended with gas, to escape. . . . I then made repeated attempts to draw the (affected) bowel out, but without success . . . when, almost in despair . . . it occurred to me to seek the lower end of the invaginated part, and try to hold the ensheathing layer so as to prevent its being drawn into folds. . . . The attempt to hold the ensheathing layer straight at once revealed the true method of reduction, for by pulling this downwards, instead

of trying to pull the involved part upwards, I accomplished the replacement with the greatest ease."

This is of course the method of operative manipulation which is practised to this day. But Hutchinson's tribulations had only begun. He went on:

The operation had been protracted and the infant was almost pulseless, but there still remained the task of replacing the intestines within the abodminal cavity. I had some difficulty . . . and several times after their return, portions escaped again before I could close the abdominal wound. Under these circumstances I was induced to prick the distended small intestine at two or three places with a harelip-pin to allow the escape of flatus. To my chagrin, however, just as I was closing the abdominal wound I observed that one of the punctures in the bowel was bubbling, and that there was a stain of feculent matter on the peritoneal surface; this was carefully wiped away and the wound closed. The child, although in extreme collapse when the operation concluded, rallied subsequently, became warm, took the breast, and passed a feculent motion. Death, however, took place in the night, about eight hours after the operation.

He drew two technical lessons from the case which remain sound general practice to this day, that "the lower end of the invaginated tract ought always to be first sought, and that reduction ought to be accomplished by squeezing it or pulling the sheath downwards, rather than by attempting to pull the contained tube out." He remained silent on the difficulties of dealing with the slippery coils of an infant's distended intestine.

It seems not to have occurred to Hutchinson that needle and thread might be obtained fine enough to permit him to close over the puncture holes which he quite rightly made, just as we do today, adding only suction to aspirate the gas and fluid.

In 1875, the *Transactions* of the Pathological Society of London carried a brief note (10) by Hutchinson of a spontaneous intussusception in a dog. With his newly aroused interest in the operative treatment he says "the layers were not in the least adherent, and it might have been reduced by traction from within the abdomen with great ease . . . It was chiefly in reference to its bearing on the feasibility of operation in these cases that the specimen was of interest."

Hutchinson's readiness to operate in 1871 is the more interesting because he had earlier been repeatedly on record as opposing attempts at operative treatment of intestinal obstruction.

Thus, in 1858 in the *Medical Times and Gazette* (11) he says, "Is the performance of Gastrotomy for Abdominal Obstructions ever justifiable? In contending that it is not, I hope I shall be held free from the slightest

wish to reflect upon the judgment of the many able surgeons who have resorted to it. The experiment was well worth trying, and it is to them that we are indebted for the facts upon which we now argue against their practice." Some of his words show the frustration of the surgeon of that day, unable to do what he knew ought to be done, but there is a complete absence of any prophetic suggestion when he writes:

> In many instances to abstain from interference involves far more of responsibility than action itself. But when we find that a reasonable calculation of probabilities is against our meddling, the case assumes an opposite character. And such I am convinced is the position in which gastrotomy for the relief of abdominal obstruction of unknown nature stands. It is easy . . . to sympathize most fully with the feelings of a surgeon . . . who has exhausted the resources of medicine, and now stands by the bedside watching his patient writhing in agony, fast sinking from the continued suffering, and unrelieved. The thought that all this is from a merely mechanical lesion, and that, could the part be got at a single touch with the scalpel might liberate it as effectually as the same result is obtained in an ordinary hernia case, is very likely to suggest a strong inducement to operative interference . . . it is however my firm conviction that the temptation ought to be resisted, and that it is the Surgeon's duty not to interfere.

In 1880 in the *Medical Times and Gazette*, in a section devoted to "Reports of Hospital Practice in Medicine and Surgery," there appeared an account "From notes taken by Mr. Grant, dresser to the case," of a "Case of Intussusception of the Large Bowel (under the care of Mr. Hutchinson)" (12).

This appeared to be a recurrent intussusception in a 48 year old woman, due to a tumor which several times presented at the anus. Hutchinson was loath to operate. Over a course of eight days he administered enemas with eventual success although his thinking as to the nature of the pedunculated tumor, "about the size of a Plover's egg," was at least cloudy, unless his dresser's notes did him an injustice. Thus, "Mr. Hutchinson said that at first he was in doubt as to the exact nature of the tumor which could be seen attached to the bowel. It was possible that it might have been an inverted vermiform appendix, considerably swollen, and he was reluctant to remove it. The history of the case was subsequently obtained and the appearance of the tongue left little doubt in his mind that the tumor was a new growth of syphilitic origin. It was more likely that by its weight the original intussusception occurred, and if it had come down again he would have been prepared to remove it." This was making a great to do over what must have been a pedunculated sigmoid polyp with repeated intussusception.

By 1889 in the first volume of his *Archives of Surgery* (13) he began

to feel defensive in his opposition to the operative treatment of intestinal obstruction in general, but did not retreat.

> It was in the Medical Times for 1858, exactly thirty years ago that I first wrote on what I then ventured to call Abdominal Taxis, as a method of treatment for cases of supposed internal strangulation. . . . In the year 1871 a successful case of operation for intussusception led me to become a warm advocate for opening the abdomen in that form of the malady, but I still remained with but little zeal in reference to operations in cases where no positive diagnosis could be made. My opinions on this latter point have been several times publicly challenged by surgical friends, and as is well known to all, during the last ten years what is named exploratory laparotomy has very definitely gained in professional appreciation. I propose . . . to review the subject by the aid of the light which modern experience has thrown upon it, and one result of this examination will be a more confident recommendation of abdominal taxis than I have ever previously given. . . .

The nature of Hutchinson's non-operative treatment of intestinal obstruction is of enough interest for a brief mention. He says, "The first point in abdominal taxis is the full use of an anesthetic, so as to obliterate all muscular resistance. Next (the bowels and bladder being supposed to be empty) the surgeon will forcibly and repeatedly knead the abdomen, pressing its contents vigorously upwards, downwards, and from side to side. The patient is now to be turned on his abdomen and in this position to be held up by four strong men and shaken backwards and forwards. This done the trunk is to be held feet uppermost, and shaking again practised directly upwards and downwards. Whilst in this inverted position copious enemata are to be given. The whole proceedings are to be carried out in a bona fide and energetic manner." He does have the grace to say that "It is to be admitted, respecting abdominal taxis, that it is a troublesome and somewhat undignified procedure."

Hutchinson's *Archives of Surgery* were planned with the sole purpose, as he says himself, of providing an outlet for his life time collection of notes, observations, and drawings in a manner less onerous than a formal text on surgery would have required. He allowed himself to meditate in his *Archives*, notes on innumerable unrelated conditions following one after another. His notes on intestinal obstruction and intussusception, appearing in Vol. 4, 1893 (14), are reproduced for their interest. It will be seen that in speaking of other forms of intestinal obstruction he has somewhat modified his previously uncompromising resistance to operation.

> It was my good fortune about eighteen years ago to perform a successful operation by laparotomy for intussusception. My case was, I believe, one of the first successes, and it naturally led to my taking great interest in the subject afterwards.

It was a case in which the intussusception was a very unusual length, the inverted head of the caecum projecting several inches at the anus. Since that time a certain number of successes by laparotomy have been recorded, and side by side with them a yet larger number in which the operation has failed to save the patient's life. In a not inconsiderable proportion of the latter, it was found impossible to effect the reduction of the incarcerated bowel.

I will place what I now have to say on the subject under a few definite heads.

Proposition I. — It is absurd to institute any comparison between treatment by insufflation or injection and that by laparotomy. The rule of practice ought to be invariably to try the former measures in the early stages. It is only when they have failed that laparotomy ought to be thought of. The two measures are not competitive, but the one is supplementary to the other. Statistical tables instituting a contrast as regards the relative success of the two measures are mere waste of labour.

Proposition II. — Whilst fully admitting that insufflation and injection treatment ought to be tried first, it is to be borne in mind that these measures are not without risk. They are to be practised with judgment and caution and not persevered in too long. In not a few instances when done too boldly, rupture of the bowel has resulted.

Proposition III — It is probable that there is not much reason for preference for insufflation, or injection of air, over injection of water. If the latter is done, the patient's body should be in the inverted position, at any rate during part of the time. As regards the details of the process, I prefer to do it by hydrostatic pressure rather than by a syringe, believing that it is more easy to estimate the amount of distensile force which is used.

Proposition IV — If the patient be an infant, say under two years of age, it will be well to be content with repeated attempts by injection. The results by laparotomy in infants have been so almost invariably fatal, that it is safer to trust to the other measures.

Proposition V — If the patient be more than two years of age, and a patient attempt at treatment by injection have failed, a prompt resort to laparotomy is to be recommended. It is desirable that this should be done early, before the serous surfaces have become adherent, or the reduction of the incarcerated portion has been made difficult by swelling.

Proposition VI. — In the performance of the operation the difficult part is the withdrawal of the incarcerated portion of bowel. It is very important to remember that this is often most easily accomplished not by traction of the upper end, but by pressure on the lower, or by the two at the same time.

Proposition VII. — The older the patient, the slower in all probability will be the progress of symptoms in intussusception, and the longer the period during which it is practicable to effect relief by operation. Thus in adults an intussusception case may be protracted over weeks and even over months. The conditions present even after a very long interval may still be such as to permit of a successful operation.

In formulating the above propositions I have made no reference to the question of diagnosis. It is usually easy. The tenesmus, the bloody mucus, and, above all,

the discovery of a tumor by manipulation through the abdominal wall, render the diagnosis of intussusception in a majority of cases very definite. It must be admitted, however, that there are cases in which it is not so easy. I would venture to urge that in all cases of abdominal obstruction which present any symptoms similar to those of intussusception, and in which the injection treatment under an anaesthetic has failed after a fair trial, that the abdomen ought to be opened.[1]

In treatment of intestinal obstruction in general, it is a most important clinical rule that the first measure should be to put the patient under the influence of an anaesthetic. This should be done at the earliest possible period in the case. It has the double object of facilitating diagnosis and permitting those measures of treatment which are comprised under the term "abdominal taxis." Under this term I include systematic manipulation, inversion of the patient's body, vigorous shaking of the body in the inverted position, and the administration of enemata, also in the inverted position. By these measures carefully carried out in any early stage I believe that in a majority of cases of mechanical obstruction of the bowels success will be obtained, and if it be not, an operative procedure will probably be necessary. This procedure must either be a colotomy or a laparotomy. The choice will depend upon the diagnosis which seems most probable, as to the position and character of the obstruction. If the case be one of intussusception, it will be very rarely indeed that there can be any doubt as to the diagnosis after an examination in this manner.

It is typical of the often repeated ironies of medical progress that only five years after Hutchinson's first successful operation for intussusception Hirschsprung (16) of Copenhagen rationalized and standardized the non-operative treatment of intussusception by hydrostatic pressure. Hirschsprung distrusted the surgery of his day no less than Hutchinson. By insisting as Hutchinson did on careful preliminary attempts at reduction by enema Hirschsprung achieved results during Hutchinson's life time which in terms of mortality have only been improved in this country in the last 15-20 years. It is a pity that there is no available comment by Hutchinson on Hirschsprung's results—although they must have been known to him.

Hutchinson was an observer, collector, compiler, a life time writer of notes, and a recorder of impressions. Such men are more likely to look about them and behind them than ahead. We can cavil at Hutchinson's observations on intussusception, which in general remain accurate and

[1] These observations are remarkable for their clarity and their soundness. They may be taken as guides for the treatment of intussusception today. We no longer make exceptions of infants, nor do we forego attempts at relief with hydrostatic pressure in the cases of longer duration, and finally, hydrostatic pressure reduction is controlled with the Roentgen ray, but the preliminary use of hydrostatic pressure, the avoidance of excess pressure, the recognition that edema and adhesions caused by delay interfere with reducibility, and the technique of reduction at open operation when required, are sound current practice (15).

sound to this day, only for his understandable failure to suggest that operative skill, surgical instruments, and sutures, and anesthesia would one day with the aid of blood transfusions and antibacterial agents progress to the point of regularly permitting successful operation on desperately ill infants who were not helped by non-operative means.

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THE WILLIAM OSLER MEDAL ESSAY

A PESTILENCE CENSUS-TAKER IN NEW JERSEY

JOSEPH A. VASSELLI

I.

Oliver Wendell Holmes once wrote, "There are one-story men, two-story men, and three-story men. Fact collectors are one-story men. Two-story men reason about facts. Three-story men are those who are described as inspired men." . . . This is the work of a one-story man.

Though New Jersey was one of the early territories occupied by the first settlers of the New World, and the first to organize a provincial society of medical men, its archives are sparsely sprinkled with accounts of the development of its medical practice and its contributions, if any, to the history of medicine in America. The only work specifically representing itself to be a history of medicine in New Jersey is that published by Stephen Wicks in 1879, titled *History of Medicine in New Jersey and Its Medical Men, from the Settlement of the Province to A. D. 1800* (Newark, 1879).

Our classical histories of American medicine contain but brief comments on activities in New Jersey and invariably either refer to the above writing as their source or to the collection of early transactions of the New Jersey Medical Society, titled *The Rise, Minutes, and Proceedings, of the New Jersey Medical Society, Established July 23d, 1766* (Newark, 1875). This situation appears to exist with respect to accounts of New Jersey's medical men, the medical Society, the state of health of its inhabitants, and other aspects of its medical growth and progress. New Jersey's colonial neighbors, however, are richly represented in our historical writings, which it is reasonable to assume is in no small part due to the existence of comprehensive and detailed studies of their medical activities.

There are secondary works on New Jersey medicine which partially fill this hiatus. Maurice B. Gordon has included a discussion of medical events in colonial New Jersey in his *Aesculapius Comes to the Colonies* (Ventnor, 1949), and has made an additional contribution in a paper titled "Medicine in Colonial New Jersey and Adjacent Areas" (*Bulletin of the History of Medicine*, vol. XVII, pp. 38-60, 1945). The latter work provides insight into the status of medicine in New Jersey about the

time of the War of Independence, as seen through the examination of items in the colonial newspapers of the period. William Meyer's historical work, *The Story of New Jersey* (New York, 1945), devotes a chapter to the discussion of early medical events in the Province and the establishment of the Society; George Lathrope presented a "Dissertation on the State of Physick in the Colony of New Jersey. Being Some Account of the Foundation of the Medical Society of New Jersey" (*Journal of the Medical Society of New Jersey*, vol. XXVII, pp. 1-10, 1930); and Mildred Naylor's "A New Jersey Petition" (*Bulletin of the History of Medicine*, vol. XVII, pp. 93-100, 1945), records the early efforts of members of the profession to secure legislation regulating the practice of medicine in the territory. Other works must be in existence, however, they have not found their way into the bibliographies of our standard works.

Fortunately, an original source of information is available in the form of transactions of the Society. Though deficient in many important respects, they are a running account of the development of organized medicine in the State, and are apparently the only detailed source of certain information, in print. While one may wonder why the absence of other writings is bemoaned, when so rich a source can be consulted, it must be noted that these documents are only with inconvenience available to those who seek to study them, and in addition, they present the formidable task of consolidating into a unified picture the many bits of data scattered throughout the numerous volumes of proceedings and administrative reports of the Society.

The historical investigator interested in the state of medical knowledge and the health of the early inhabitants of New Jersey finds the transactions a rich source of data. Existing works on American medicine either contain only minor reference to disease prevalence in New Jersey (coincident with discussions of epidemic illness in neighboring States), or are lacking in full coverage of New Jersey. It is difficult to believe that widespread epidemics could have raged in New York and Philadelphia without coincident prevalence in New Jersey, the central belt of which forms the main route of communication between these two cities.

II.

Francis Packard, in the Introduction to his monumental treatise of 1931, stated, "Any attempt at a History of Medicine in this country is necessarily more or less confined to the story of the development of institutions and the narration of the lives of the men who have influenced

the medical practice and thought of their time." [1] This would likewise apply to the history of any designated section of the country; it is the basic approach to the study of medical history, no matter how small the unit under consideration.

Your writer begs to suggest another approach, at least in the consideration of this paper. Since history is essentially an account of the thinking and actions of men,—and since the history of their success is, therefore, an account of the results stemming from their thoughts and actions,—is it not possible to judge the success of efforts of the medical profession to increase its usefulness and advance its prestige (through the establishment of institutions, the raising of educational and ethical standards, the organization of the ranks of the profession, etc.), by the degree to which it has met its ultimate aim, the betterment of the public health? More specifically, can it be judged by the degree to which these actions have been inversely paralleled by a decrease in incidence and severity of State-wide or community-wide endemic and epidemic disease? It would appear that such a correlation has undoubtedly existed; its demonstration, by application of this approach to the study of specific disease occurrence in a particular territory, over a long term period, is the aim of your writer in the somewhat chronological presentation that is to follow.

It is well known that the development of sanitation, improved living conditions and facilities, changes in climate, and numerous other essentially non-medical factors have had a marked influence on local disease incidence, to a degree ranking favorably with the influence of advancement of medical knowledge, water purification, milk pasteurization, vaccination, and similar factors. In addition, it is a matter of record, that the passage of time has seen an alteration in the manifestations of certain diseases and their virulence, to the extent that particular diseases have entirely disappeared from the State due to unknown factors apparently unrelated to either direct or indirect action by the profession or the public. Rather than invalidating the approach suggested above, these considerations serve to make such a proposed study more intriguing.

Towards these ends, the transactions of the Society were carefully searched for reports and investigations of the state of the public health in the state. Although transactions were preserved from the date of the first meeting of the Society, on July 23, 1766, it was not until the year 1859, that yearly publication of the *Transactions of the Medical Society*

[1] Francis R. Packard, *History of Medicine in the United States*, New York, 1931, p. ix.

of New Jersey became routine procedure. At an annual meeting held on May 25, 1875, a committee was appointed to examine all the old records with a view to publication of the transactions of meetings held prior to 1859. This resulted in the publication of *The Rise, Minutes, and Proceedings, of the New Jersey Medical Society, Established July 23d, 1766,* containing the "Narrative of the Rise and Establishment of the New Jersey Medical Society" and transactions of the bi-annual meetings held between 1766 and 1859. These appeared in a single volume in 1875, as a supplement to the *Transactions of the Medical Society of New Jersey, 1875.* Transactions of all meetings held after the year 1858, were published in single volumes yearly to the year 1904, when they appeared in the newly established organ of the Society, *The Journal of the Medical Society of New Jersey.*

These records are complete and consecutive, except for the years 1776-1780, when meetings were suspended during the War of Independence, (a substantial portion of which was fought on New Jersey soil), and the years 1796-1806, during which no formal meetings were held for lack of an official quorum. These lapses prompted Burrage to write, "The Massachusetts Medical Society, founded in 1781, is the oldest medical society in the United States with a record of uninterrupted meetings from its founding to the present." [2] This claim detracts little from the fact that the Medical Society of New Jersey was the first society to represent the members of the profession within provincial boundaries, and the only society in existence today, which was organized prior to the Revolution.

III.

Some forty-four years were to pass after the establishment of the Society before it turned its attention to matters relating to the public health. These years were spent in consolidating the membership, initiating action aimed at incorporation and licensing, and other activities primarily professional by nature, and only indirectly related to the public interest.

In 1810, a committee was appointed ". . . to make as accurate and extensive meteorological observations as circumstances will allow, and lay the same before the Society at their next meeting." [3] On June 9, 1812, the committee submitted its report, ". . . as well, of the state of the weather or of the prevailing diseases of the last year. . . ." [4] This report was not

[2] Walter L. Burrage, *A History of the Massachusetts Medical Society.* With brief biographies of the founders and chief officers 1781-1922, Norwood, 1923, p. 1.

[3] *The Rise, Minutes, and Proceedings . . .* (Transactions of 1810), p. 134.

[4] *Ibid.* (Transactions of 1812), p. 137.

preserved in the transactions, and no similar action was undertaken by the Society until 1822.

At an annual meeting held on May 14, 1822, by a motion of the Society, it was ordered that a member of each District Society make a report to the Standing Committee, ". . . on or before the first day of March of each year, the general state of health, and the character of the prevailing diseases of his district. . . ." [5]

The first reports appeared in the year 1822, and were followed more or less regularly by surveys from various counties of the State in which District Societies had been organized. As the years passed, and each county became represented with the Society, coverage of the State became more complete, and after the beginning of the twentieth century all twenty-one counties of the State regularly submitted their reports. These reports now constitute an enormous collection of detailed data describing the state of health of the inhabitants of New Jersey, each year from the submission of the first reports in 1822. This eventually forced the writer to arbitrarily elect to consider the reports submitted at each ten-year interval from those first submitted. It was felt that this would adequately serve to demonstrate changes in the state of medical knowledge and thought by the profession, the application of new methods of therapy, the effects of coincident public improvement in sanitation and living conditions, as well as the incidence and severity of endemic and epidemic illness.

Fortunately, except for the year 1862, when the Civil War interrupted activities of the Society, some reports from various counties of the State are available for study at each selected interval under investigation. Reports submitted for the year 1861 were used to fill the gap. Other gaps exist at each period, however, in the extent of coverage of the State, for varying numbers of counties are represented at each period. In 1822, when the first surveys were submitted, only eight of the State's twenty-one counties were under charter of the Society, and of these, only six complied with the direction of the Society. New District Societies were chartered throughout the period under survey.[6]

The disease surveys which are to follow, therefore, are compiled from

[5] *Ibid.* (Transactions of 1822), p. 199.

[6] The District Societies were organized and chartered as follows: Cumberland, Essex, Middlesex, Monmouth, Morris, Somerset (1816); Gloucester (1818); Hunterdon (1821); Warren (1826); Burlington, Sussex (1829); Passaic (1844); Camden (1846); Mercer (1848); Hudson (1851); Bergen (1854); Union (1869); Atlantic, Salem (1880); Cape May (1883); Ocean (1903). (From *The Official List of Fellows and Members of the Medical Society of New Jersey, March 1, 1945*, pp. 27-62.)

data representing geographically different areas of the State at each ten-year interval, except for three periods when all twenty-one counties reported. Because of this inconstant coverage, no attempt has been made to interpolate the data on a State-wide basis, and State-wide prevalence is noted only when a county reporter stated or suggested such incidence in his local manuscript. An analysis of data included in this survey is as follows:

Survey Year	*Counties Chartered*	*Counties Reported*
1822	8	6
1832	11	1
1842	11	1
1852	15	6
1861	16	7
1872	17	15
1882	19	16
1892	20	21 *
1902	20	12
1912	21	7
1922	21	20
1932	21	21
1942	21	21

* The unchartered county was covered in the report of an adjacent county.

The local county surveys were consolidated and summarized each year by the Standing Committee, for more convenient submission to the Society, however, the original reports were published in the transactions, and these were consulted in each instance, in the preparation of this paper, in the hope of uncovering more significant and interesting information. It must be kept in mind, in evaluating reports of incidence, that the concepts held by District Society Reporters as to the degree of incidence constituting epidemic proportions, must have been at variance with those of Reporters of adjacent counties in each reporting year, and certainly at greater variance with concepts held by Reporters at the extremes of the survey period. Their impressions were markedly influenced by the limitations imposed by poor facilities for communication and travel, their difficulties in securing data from physicians in then remote, sparsely settled portions of their counties, and their tendency (therefore) to interpolate freely from the state of health existing within their immediate practice in a limited area of the county. In the absence of a unified plan of public health reporting, these weaknesses in coverage were inevitable. Few re-

ports contained statistical data, so it is difficult to determine the change in concepts of epidemic incidence which must have occurred with the passage of time. Epidemic proportions reported in the later years of the survey must have involved a much smaller number of actual cases, and a still smaller proportional incidence in the face of a constantly expanding population.

It is also difficult, if not impossible, to determine at this time the numerous errors in diagnosis contained in the reports, by the profession as a whole resulting from the state of medical knowledge of the time, or by individual Reporters of lesser training, experience or ability. Certainly many of the fevers were confused, hardly more so in the New World than the Old, during a period of medical history when the basic concepts of many of the disease processes were still to be demonstrated. Pasteur, for example, was born in 1822, the very year of submission of the first disease surveys to be studied. This by no means implies complete lack of reliability of their reports, for most physicians readily understood and applied the main differential features of most of the diseases widely prevalent during the earlier periods of the survey.

No specific attempt has been made to correct or suggest points of possible error in the county reports analysed. These incongruities serve to further illustrate the difficulties under which the profession labored in its struggle against disease, however, it is beyond the scope of this paper to undertake such interpretive studies.

IV.

Malarial Diseases

The history of medical events of most of the colonies of the Atlantic seaboard contains reference to the wide prevalence of malarial-type fevers, often attended by unusual virulence and high mortality.[7] This was confirmed in the reports of 1822, for all six of the reporting counties [8] noted the presence of "intermittent and remittent fevers" [9] throughout the

[7] Joseph M. Toner, in his *Contributions to the Annals of Medical Progress and Medical Education in the United States before and during the War of Independence*, Washington, 1874, pp. 94-95, made no report of epidemics of malaria, but listed 101 epidemic years (affecting 38 localities) of yellow fever and "plague" in the colonies to the year 1800. Included in these are two in N. J.—at Bridgeton and Woodbury, in 1798.

[8] Cumberland, Essex, Hunterdon, Monmouth, Salem, and Sussex.

[9] Intermittent and remittent fevers were usually malaria, though other fevers were frequently incorrectly referred to under these names.

warm months of the year. The intermittent types began during the summer, giving way to remittents in the fall months, while both declined with the beginning of winter.

The Reporter from Sussex County, a resident of Newton, attributed these fevers to certain conditions existing in the natural topography. He noted, that in addition to the numerous limestone-rock ridges and ledges, there were a correspondingly large number of hollows or depressions which collected water, many of which were without outlets. Speaking of three such areas near Newton, he stated:

> . . . [they] average from half to a mile and a half in circumference; in these the water is very shallow, and in dry summers a considerable portion of the putrid vegetable matter is exposed dry to the sun, from which marsh miasm exhales in abundance.[10]

He considered this the site of disease production affecting the residents of Newton.

In the vicinity of Newton these diseases began about the middle of July, and continued to about the first of November. In Sparta, however, a village seven miles east of Newton, the Reporter continued:

> . . . these diseases show themselves earlier than in any other part of the neighborhood. Near the village a small stream of water runs, which, in consequence of a saw-mill dam, overflows the meadows above (I have been told) to the extent of nearly 100 acres. The water in hot and dry weather being scarsely sufficient to cover the putrid matter upon the surface of the earth. A very offensive and nauseous smelling effluvia is exhaled, to which the diseases epidemic in that district are attributed.[11]

Treatment consisted of emetics and certain drugs which were known to relieve the symptoms. In other instances, ". . . the patient would find relief from the loss of a few ounces of blood in the commencement of the attack." The Reporter observed, however, that with the latter treatment, ". . . the disease is in the first instance easily removed, [but] it leaves the patient in a situation which renders him peculiarly liable to its future attacks." [12]

From Cumberland County, it was reported that although the ague [13] was widespread twenty to thirty years earlier, especially in the neighborhood of the marshes and creeks, the last decade had seen less of that

[10] *The Rise, Minutes, and Proceedings . . .* (Transactions of 1822), p. 205.
[11] *Ibid.*
[12] *Ibid.*
[13] Ague was the name usually given to the severe chill which preceded intermittent or malarial attacks, however, it was frequently used to refer to the disease state itself.

disease, but more remittent and "continued bilious fevers." [14] (The years 1819 and 1820 were said to have seen serious epidemics of the ague in the same localities.) As to the cause of the fevers in his vicinity, the Reporter wrote:

> The most malignant cases of bilious fever have more commonly made their appearance in the lowest grounds, but they occur indiscriminately in every part of the district under consideration. I have known several instances of the villages where large quantities of wood in a seasoning state was stored, to be peculiarly sickly, which has induced a belief with many, that deleterious exhalations were produced from the wood. It is a fact that the vicinity of new mill-ponds are almost invariably sickly in our part of the country; in the season, after the water is stopped, the wood then drying and decaying in consequence.[15]

As in the previous county report, the proposed treatment was the administration of emetics, especially after bleeding. In intermittents, a solution of arsenic, or herb combinations of bark,[16] snake root, and salt of tartar, were also believed of benefit.

The report from Salem County contained an account which further demonstrated the wide acceptance of the belief that "miasma" was the cause of the then prevalent fevers. It was stated:

> On the 3d of July a great torrent of rain fell, which inundated all the low grounds in this part of the country; hundreds of acres of banked meadow, under fine grass fit to be mowed, were in a few hours overflowed to the depth of one or two feet . . . the water draining off but slowly (it taking four or five days), the consequence was, all the grass was destroyed, and became very offensive; the water so foul and so fully saturated with putrid matter, that the fish died in great abundance; the noxious effluvia which exhalted from this source was a great annoyance to the whole neighborhood.[17]

The report continued by relating that this was accompanied by a marked increase in sickness, mostly mild intermittent fevers. Near a town called Alloway's town, in which vicinity there was a large empty mill-pond, the prevalent fever ". . . resembled strongly Rush's bilious remitting yellow fever." [18] There were many deaths. The wide extent to which fevers

[14] The term "bilious" or "bilious remittent fever" appears to have been applied to various diseases; sometimes it must have been malaria, dengue, yellow fever, or even dysentery. The "continued" nature of this fever, however, indicates that it may have been typhoid or typhus.

[15] *The Rise, Minutes, and Proceedings* . . . (Transactions of 1822), p. 207.

[16] This is probably cinchona or Peruvian Bark, which was introduced into England about 1655, and was therefore well known to many colonists.

[17] *The Rise, Minutes, and Proceedings* . . . (Trans. of 1822), pp. 217-218.

[18] This was the name given by Rush to the fever which raged in Philadelphia in the summer of 1780. It is believed to have been dengue, and was called "break-bone fever" by the populace. (Cecilia C. Mettler, *History of Medicine*, Philadelphia, 1947, p. 391.)

existed in the county is indicated by the Reporter's comment, that, ". . . up to the middle of October, intermittent and remittent fevers became so general that, from a rough estimate, not more than one-half the population of this County escaped." [19]

Not all the physicians were satisfied with the popular beliefs concerning the cause of fevers. One of the contributing physicians of Essex County reported:

> Respecting the causes of this fever, I have said nothing, for I know nothing in our climate or the topography of this district, which will satisfactorily account for the generation of the miasmata (the fruitful source of intermittents) more the past than in former years. . . . In some places on the banks of the Passaic, at the distance of eight or twelve miles, intermittents occur annually, and often prove (as was the case last year) very fatal. But a considerable range of mountains intervene; and if it is possible to suppose the miasma to be transmitted through the air over this elevated ground, we have then the prevalence of our intermittents accounted for. But, it may be asked, why is it not this occurrence more uniform? and, besides, the prevailing winds, while the fever continued among us, were from a directly contrary quarter. To me, it appears more probable they originated from causes wholly independent of marsh effluvia.[20]

Two other counties [21] also reported many cases of "remittent bilious fevers," and as treatment, "Blood-letting, in more than half the cases, with quiet, exclusive of light and company, were essential." [22]

At the next survey period, in 1832, the single reporting county [23] indicated the continued presence of intermittent fevers, which were blamed on an unusual rain in the early part of the summer season. It flooded the low country, cellars, sewers, and drains in the towns, and gave rise to an "abundance of miasma."

Ten years later, in 1842, the sole reporting county (Hudson) experienced an epidemic of intermittent fever following an epidemic of "congestive fever" [24] in the Hoboken district. The disease had not existed there for eight years previous. Its reappearance was attributed to a grading of the land surface, which had begun three years before, but not having been completed, caused the surface water to collect and generate its poisonous fumes.

In 1852, three of the six counties reporting, listed the widespread preva-

[19] *The Rise, Minutes, and Proceedings* . . . (Trans. of 1822), p. 218.
[20] *Ibid.*, p. 211.
[21] Cumberland and Monmouth.
[22] *Ibid.*, p. 203.
[23] Passaic.
[24] Influenza (?).

lence of intermittent and remittent fevers, which were, for the most part, mild and responsive to bleeding. One Reporter offered a combination of cinchona bark and black pepper as an efficient remedy. An epidemic in Passaic County followed an epidemic of scarlet fever, while in Essex County, the fevers began in the spring and were reported to have continued into the winter. The winter was a very severe one, and the fevers were frequently accompanied by complications, such as "inflammations of the brain, bowels or lungs." [25]

The "miasmatic diseases" were less frequent in Essex County, in 1861, with some physicians having no cases to report. The decline was attributed to a variety of factors, the season, temperature, location, sewerage developments, paving, and the enforcement of hygienic and sanitary laws. The report added, however:

> The removing of garbage and refuse-water from alleys and tenant-houses, paving and grading of streets, drainage of ponds, etc., by sewers, are all undoubtedly powerful auxiliaries for the removal of this disease; but how do they account for the absence of it where these influences can not affect it? Does not this disease, like some which we call epidemic, appear at irregular periods independent of the generally acknowledged cause? [26]

The Reporter from Hunterdon County, a resident at White House after about 1811, stated that he found intermittent and remittent fevers very prevalent at that time, and they continued regularly each of the next twenty years. After that, they were a rare occurrence in that area until,

> During the construction of the New-Jersey Central Railroad, however, which was within half a mile of this place, I had a vast number of cases of Intermittent Fever in the persons of Irish and German laborers. . . . All these persons had received the seeds of this disease abroad, having been working on railroads or ditching in malarious districts. Very few of the native population were affected with either Intermittent or Remittant Fever.[27]

Concerning the diminished intensity of the disease, the Reporter wrote:

> The principal if not the sole cause of the cessation of malarious fever among us, is to be found in the drainage of the Rockaway, a small stream running near the village at White House. Formerly there were two milldams on this stream. . . . Both of these ponds submerged many acres of land. The depth of water for some extent on the margins of these ponds was very inconsiderable, so that in the

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[25] The late distribution of these fevers indicates that the Reporter may have failed to differentiate the prevailing fevers; the complications further suggest that many of these cases may have been typhoid.

[26] *Transactions of the Medical Society of New Jersey, 1861*, p. 81.

[27] *Ibid.*, p. 86.

summer and autumn, when the water was low, these margins were exposed to solar action, and consequent generation of the marsh miasma. One of these ponds was on the west and the other on the north-west of White House, both within a few hundred yards of the village, and both wafting malaria thitherward.[28]

In 1806, the mill-dam of the largest pond broke down, and was rebuilt about 100 yards upstream. A race prevented the water from flooding the land. The other mill-dam was removed about 1824, leaving the Rockaway with unobstructed flow. When the original mill-ponds fell under cultivation, " Accumulated vegetable material, the deposition of years, was thus eposed to solar action. The natural consequence was that for the first three years after the removal of this last dam, malarious fevers exceedingly abounded. Since this period . . . malarious fever is rare. . . ." [29]

As remedies for the intermittent fevers, quinine supplanted Peruvian Bark, and a new remedy was suggested containing spider's web as the main ingredient. The Reporter commented, " I have used it extensively, and have been highly pleased with it. . . . I gave it in the form of pills. Two scruples of the Tela Aranea were rubbed up in a mortar, with gum-arabic and water, and made into eight pills. . . ." [30]

In the same year (1861), the Reporter of Warren County stated that intermittent and remittent fevers formed a substantial part of the diseases of the Paulus Kill Valley. In spite of the hilly and rugged character of the district, which left little opportunity for the collection of wide areas of water, the frequent use of mill-ponds, it was believed, ". . . favors the production of malaria." The residents along the stream, near the mill-ponds, were more or less subject to yearly attacks.

Sussex County reported that the " malarious diseases," including intermittent and bilious remittent fevers, were almost non-existent as a result of improved drainage in the County.

Camden County also saw a limited prevalence of intermittent fever, although some cases were severe. These were most frequent along the shore of the Delaware and adjoining streams.

Cumberland County, while reporting a decrease in the " summer diseases " as a result of a very dry season, submitted an interesting commentary by one of its physicians, who advocated " stimulating " the system of patients, to bring about a cure. He wrote:

Active purgation has given place to a tonic course of treatment, trusting to nature to relieve the system of the exciting causes of the disease. Our " fathers in

[28] *Ibid.*, p. 87.
[29] *Ibid.*
[30] *Ibid.*, p. 88.

medicine," whose favorite practice was to deplete, to pull down, trusting to nature to build up and restore, would find their skill sorely taxed, were they living at the present day, and to follow their favorite theory. Fevers have so changed in tendency, if not in form, that to follow out the practice of blood-letting and purgation, is in many cases to consign the patient to an untimely grave.[31]

The wide extent to which drainage was being used to remove sources of odors of decomposition is indicated in the Cumberland County report. After commenting on the marked decrease in the incidence of these fevers, the report concluded:

This is doubtless owing, in a great measure, to the fact that much of the low and marshy land has been drained and put under cultivation. The morning breeze, which formerly conveyed to us the poisonous exhalations of stagnant pools and decomposed vegetable matter, now comes laden with the fragrance of flowers or the odor of new-made hay. This change is not universal, yet quite extensive; so much so, that very many localities that were formerly the home of diseases, originating from this cause, are now comparatively strangers to it.[32]

In the year 1872, eleven of the fifteen reporting counties contained reference to these fevers. Three [33] of these reported a marked decrease in malarial illness, while the remainder [34] had increases over previous years. One of these reported, "We are never rid of Periodic Fever." It was followed by an interesting observation:

As farmers and their laborers by machinery now cultivate, gather and thresh their crops, drink iced water and less alcoholic stimulants during the harvest time, and more generally practice hygienic laws than formerly, I believe they are consequently more healthful.[35]

In Middlesex and Hudson Counties, the physicians complained about improvement work which they believed the cause of increased illness in many localities. In New Brunswick, where intermittent fever had previously been unknown, many cases were treated. The report added, "This may be explained by the fact, that in the city of New Brunswick . . . sewerage has been in progress, and large quantities of new earth exposed to the atmospheric influence, thus developing malarial disease." [36]

In Hudson County, where the inhabitants were being attacked with increasing severity each passing year, the Reporter commented:

[31] *Ibid.*, p. 107.
[32] *Ibid.*, p. 113.
[33] Camden, Cape May, and Gloucester.
[34] Bergen, Burlington, Hudson, Mercer, Middlesex, Monmouth, Passaic, Sussex.
[35] *Transactions of the Medical Society of New Jersey, 1872*, p. 240.
[36] *Ibid.*, pp. 286-287.

. . . whether due to a more general, widely-spread miasma or to particular local but extensive improvements in grading, excavating and reclaiming, it is difficult to determine. Immense quantities of street sweepings, redolent with all the odors of decomposition, of both animal and vegetable matters, are still used to fill in the low lands of our shore. Sunken lots, so made the receptacle of all that is offensive to the eye and nose, become foul fountains of disease and death; so that the wonder in some neighborhoods is, not that there so many sick, but that there are any well.[37]

In 1882,[38] sixteen of nineteen counties reported the continued prevalence of malarial disease, and only two counties saw a decrease. In Bergen County, where the fevers were widespread, a Reporter stated:

. . . cases of chronic malarial poisoning were dwellers in stone houses of the "old Dutch" model, where it is the custom to keep the best rooms closed except on state occasions. The walls of these houses readily absorb moisture from the atmosphere, and render the air damp and stifling; and it is no uncommon thing to find, boots, shoes and other articles covered with a low order of vegetable life. Such an atmosphere must certainly exercise a decided influence in the production of this so-called "malaria," as well as of numerous other diseases.[39]

In Burlington County, intermittent fevers led all other diseases in 1882, followed next in frequency by many cases of cow-pox. The Camden County Reporter included in his account the statement of a resident physician, that his report might well consist of one word, "malaria."

Somerset County offered accounts by two of its physicians who were attempting to explain outbreaks in the areas of their practice. One, a physician of Neshanic, observed:

. . . my attention was directed to a piece of waste ground—perhaps an acre—which had been used for several years as a place to dump the refuse from the dry-house of a fruit-preserving factory, then located here. The stench from this was so great that one could not walk across it, and, in my opinion, fully accounted for the outbreak of fever. One case, a man living within a stone's throw of this place, proved fatal; and the cases were severe, just in proportion to the distance they lived or worked from the refuse heap.[40]

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[37] *Ibid.*, p. 265.

[38] Three years earlier, in 1879, Patrick Manson reported his observations that an invertebrate could act as an intermediate host for a disease producing agent; he was studying filariasis. During the next year, Alphonse Laveran discovered microscopic bodies in the red blood cells of malarial patients, and in 1897, Ronald Ross developed the cyclical history of the organism and proved that *Anopheles* was its carrier. Carlos Finlay and Henry Carter, in 1881 and 1900, respectively, applied these principles to yellow fever. Walter Reed, and his associates reported in 1901 the conclusive proof that *Aedes aegypti* was responsible for its transmission. (Mettler, *op. cit.*, pp. 272-273.)

[39] *Transactions of the Medical Society of New Jersey, 1882*, p. 196.

[40] *Ibid.*, p. 248.

The second physician, practicing in Somerville, noted:

> My attention has been strongly called to the condition of the subsoil in the neighborhood, and I suppose the same facts obtain over a wide region. The ground is wet on the surface, but begins to be dry at about two feet deep, and is very dry at four feet. The usual moisture does not appear until a depth of from fifteen to twenty-five feet is reached. It seems that the supply of rainfall has been for some years insufficient, and that the store of moisture in the ground has been steadily drawn upon. The rapid subsidence of the streams after rain, and the diminished outpour of deep springs, also show this. Is it not possible that a connection exists between the unusual dry subsoil and our malarial epidemic? I know of no other cause so wide-spread, so universal, as to account for the epidemic of periodic diseases from which we now suffer. This is as yet only a theory of mine—perhaps fantastic; but I call attention to it, as proof or disproof of its truth may thereby appear.[41]

In the year 1892, only two of twenty-one counties indicated that intermittent fevers had been treated. In Hudson County it was reported by two physicians, and by three physicians of Middlesex County. One of the latter believed, ". . . the disturbance of the palludal poison in the mining of clay and sand keeps malaria alive and we have it always with us." [42]

In the year 1902, although twelve counties were represented, only one physician reported the presence of malaria. His observation, that it had persisted throughout the year, suggests that if the disease did occur at all, he had failed to distinguish it from other fevers which prevailed concurrently. In any event, this was the last mention of malaria, intermittent or remittent fever, in any report submitted at the various survey periods, through the survey of 1942.

This phase of our survey closes, then, without a single reference in the transactions (realizing the imposed gaps in coverage agreed upon), to the pestiferous mosquito which was responsible for spreading misery and death among the inhabitants of the State under the very noses of physicians who failed to note their true significance as they flew in swarms in the "malaria" rising from the swamps and other collections of stagnant water. Also absent from our survey, is a satisfactory explanation for the disappearance of these diseases, coincident with the discovery of their etiology, but apparently unrelated to that discovery or any other direct action of the profession or the populace, for numerous unclaimed swampy areas still exist to nourish the mosquito's wriggling young.

[41] *Ibid.*, pp. 250-251.
[42] *Transactions of the Medical Society of New Jersey*, 1892, p. 257.

Scarlet Fever

This highly contagious fever severely and fatally attacked children and adults alike, in the days of the early settlement of the colonies, having been brought over from the Old World where it was well known.[43]

Although there were many general references to fevers in the reports of 1822, scarlet fever was not mentioned in any of the six county summaries submitted.[44] In 1832, however, the disease was epidemic in Passaic County (the sole county reporting), whose Reporter described the presence of the disease in many of the neighboring counties. Similar conditions existed in four counties [45] in 1842. Of these, Essex County had numerous fatalities, and its report stated, ". . . that dreadful scourge, which is wont to make desolate so many households, has continued on considerable ravages." [46] The same year in Hudson County, saw scarlatina widely prevalent, starting at the northern extremity of the county, along the course of the Hackensack River, and taking in Jersey City. These conditions had persisted there for several seasons. The district of Hoboken, however, had uniformily escaped for the previous seven years, except for two isolated instances which did not spread. Belladonna, cayenne pepper, brandy, and yeast tea were widely used in treatment.

Scarlet fever was apparently mild throughout the State in 1852, for only two of six counties mentioned it in their reports. In Essex County, the vicinity of Newark had many cases which were mild and "required little care." The fevers were likewise mild in Passaic County, but were characterized by complications of the kidneys which did not respond to the common remedies.[47] The Reporter included mention in his report, of a physician in the county, who after much experimentation, found that the application of leeches over the region of the kidneys, followed by warm poultices, was the best treatment for this complication.

Two counties [48] reported severe epidemics in the year 1861, and three others [49] treated numerous sporadic cases of scarlatina in many localities.

[43] Toner, *op. cit.*, pp. 94-95, lists forty-two epidemic years between 1702 and 1800, in various localities in the colonies. The only reference to New Jersey is at Redbrook, in 1789.

[44] Scarlet fever was confused with diphtheria and other fevers, well into the nineteenth century, in both the Old and New Worlds.

[45] Essex, Hudson, Union, and Sussex.

[46] *The Rise, Minutes, and Proceedings* . . . (Transactions of 1842), p. 372.

[47] Kidney disease with albuminuria and edema, as a complication of scarlet fever, was noted in the writings of Richard Bright in 1836.

[48] Essex, and Camden.

[49] Hunterdon, Sussex, and Camden.

In Newark (Essex), the epidemic began in the fall of 1859, and except for a short interval, continued to the time of reporting. Based on duration, the number of people attacked, and the variety of forms it assumed, the epidemic was stated never to have been surpassed or equalled in the City. During the period September 1, 1859, to January 1, 1860, there were 96 deaths in the city, and 233 additional deaths in the next twelve months period. The deaths were estimated to be in a ratio of 1 to 10 of those attacked, which indicates that there were approximately 3,290 cases in Newark during the sixteen-month period. In Camden County, the fever began as early as the latter part of June, ". . . and the mortality considerable." One physician, practicing in Camden, had 120 cases during the year, with 12 deaths, or a mortality again of 10%.

In 1872, ten of fifteen counties reported the disease, although in three [50] the cases were few, and Camden County, where it had been prevalent in the past, scarcely had enough cases to report. Three other counties saw many cases,[51] though no epidemics, and three more counties [52] were severely attacked. One of the latter, Hudson County, had its "usual" epidemic. In Hunterdon County, two physicians of Lambertville had over 300 cases, the majority of which were in the upper part of the city, ". . . in a region where the people generally use cistern water," and these physicians believed the use of such water had much to do with its presence.

Nine of sixteen counties in 1882, were variously subjected to the ravages of this fever. Five [53] of these had many cases, but no epidemics. In Morris County, a severe epidemic followed an epidemic of diphtheria. It was of such a malignant type, that there were many who died within forty-eight hours of the first attack. At Paterson (Passaic), the epidemic took place during the late winter, and spring, though the cases were mild, and of short duration. The Reporter of this county suggested sponge baths, wet packs, cold baths, and ice given by mouth as the treatment believed most effective, by many of the resident physicians of the county, in those cases where the disease was attended by very high temperatures. This Reporter also provided the first information to the beginning of modern methods of combating this and other contagious diseases. The Reporter stated:

[50] Cape May, Mercer, and Passaic.
[51] Bergen, Essex, and Sussex.
[52] Hudson, Hunterdon, and Warren.
[53] Bergen, Hunterdon, Salem, Somerset, and Sussex.

In Paterson, a city ordinance requires each physician to report every new case of contagious disease to the City Physician, who, upon receiving such notice, immediately forwards the patient's name and address to the Secretary of the Board of Education. He, in turn, notifies the Principal of the public school in whose district the case resides. If it be found that any children are attending school from the infected house, they are debarred from further attendance until they can bring a certificate from the attending physician to the effect that he has not treated any person in that particular house for any contagious or infectuous disease for a period of four weeks. If any pupil is absent from school, inquiry is promptly made by the teacher, regarding the cause of non-attendance. Should the detention be caused by indisposition of the child, or any member of its family, the character of the indisposition is thoroughly investigated. By this method, probably few cases remain undiscovered or escape quarantine. . . . I believe that children have been safer in school than out of it.[54]

From Warren County, it was reported that an epidemic occurred in the town of Washington, which was so malignant and widespread that the public schools were closed for several weeks.

In the surveys of 1892, all but three counties of the State had a considerable number of cases. In nine of these the fever prevailed " as usual," however, epidemic proportions existed in the remaining counties. Some of the reports contained statistics of the number of cases reported in certain communities. Bridgeton (Cumberland) had 271 cases during the previous year; Trenton (Mercer) had 728 cases in 1891 (an increase of 360 cases); New Brunswick had 146 cases; and Paterson had 356 cases with a 5% mortality.

The Hunterdon County report of 1892, was the first to contain a reference to " micro-organisms " as the cause of disease. It stated:

It therefore seems quite probable that the micro-organism, or its spores, upon which scarlet fever depends, is carried by the air from place to place, and when it find suitable conditions for its growth and development, from this point as a center, it disseminates itself, infecting those within its reach.[55]

In 1902, only three [56] of twelve counties referred to the disease, with only Gloucester noting epidemic proportions. Atlantic County was alone in reporting the disease in 1912; it was mild and the patients were few in number, which must have been the case throughout the State. The remaining surveys to 1942, made no mention of scarlet fever.

[54] *Transactions of the Medical Society of New Jersey, 1882*, p. 240.
[55] *Transactions of the Medical Society of New Jersey*, 1892, p. 251.
[56] Burlington, Mercer, and Gloucester.

Diphtheria

Diphtheria was a serious and fatal disease in the early days of the colonies, and it severely attacked the inhabitants in the years that followed.[57] In spite of general widespread prevalence of the disease at various times in adjacent territories during the entire nineteenth century, however, no mention of the disease appeared in the surveys under consideration until the year 1861, when all seven of the reporting counties noted its presence. One report, that of Cumberland County, suggests a reason for this—namely, confusion in its recognition, particularly with scarlet fever. The report stated:

> The principal affection which has prevailed to any great extent has been Diphtheritis. This disease has attracted more or less attention since its origin in 1858, and has yearly become more common, and from statistical reports, less fatal. . . . Our physicians are divided in their opinion as to the contagious nature of the disease. While some are willing to admit that it possesses this property, others are loth to invest it with so great power.[58]

It would appear that prior to the time indicated, the disease was not considered a distinct entity by many of the physicians of the period. The Essex County report supports this assumption, by stating that many of the resident physicians considered it identical with a form of scarlet fever. A physician of Gloucester County, in the same year, referred to it as "scarlet fever without the erruption." Another physician of the latter county noted 107 cases, with 13 deaths.

The disease was apparently limited in distribution in 1872, for only two [59] of fifteen counties mentioned the disease, and in both instances, to note its almost complete absence.

This was not the case in 1882, however, when ten of sixteen counties reported it, with epidemics raging in five of these counties.[60] Two other counties [61] had a large number of sporadic cases, and the remaining had moderate incidence.

[57] Francis Packard, *The History of Medicine in the United States*, Phila., 1901, pp. 96-99, lists epidemics in New England and New York in 1659, 1662, 1733, 1735-36, 1742, 1755, 1775, and 1787. New Jersey was included in 1735-36.

[58] *Transactions of the Medical Society of New Jersey 1861*, p. 107. This disease was known by many names, including cynanche trachealis, angina maligna, throat distemper, and scarlatina maligna, which in themselves suggest the confusion existing in its differentiation from scarlet fever and other conditions accompanied by involvement of the throat.

[59] Camden and Mercer.

[60] Camden, Morris, Middlesex, Salem, and Warren.

[61] Sussex and Passaic.

The problem which diphtheria presented to the physicians of this period is well illustrated by the comments of two such physicians who assisted in compiling the reports of 1882. The first was a resident of Middlesex County, who reported a case which he hoped might "throw some light on the communicability of diphtheria." He wrote:

> A servant in a family where two severe cases of diphtheria had occurred, went to her home two and a half miles distant, in a section where there had been no cases. . . . Five days later she was dead, and two children showed signs of the disease. Within ten days, five of the children had died, and a sixth went unscathed because he was not permitted to go into the house. The poison was introduced into the room in which the family lived, and where some of them slept. . . . To prevent outbreaks of disease from extending is now a duty of the physician so plain as to have become an important part of his professional work.[62]

The second physician lived in Warren County, and said of the disease:

> Many authorities are of the opinion that diphtheritic croup is a curable disease, and amenable to treatment. But it is the opinion of the writer, after several years of practice and close observation with this formidable disease, that after it has taken on the laryngeal form, there is no permanent relief except death. . . . My prognosis for the past two years has always been unfavorable, and I have never failed, when seeing a patient with this dreaded trouble, to inform the friends that they might look for a fatal issue; and I have never yet been disappointed.[63]

In 1892, four counties[64] noted a very low incidence, although one locality of Cumberland County totaled 130 cases in the year ending May 1, 1892. In eight other counties, epidemics were the rule, in many instances, of a very malignant type. Newark (Essex) had 409 cases (a decrease of 75 over the previous year); Trenton (Mercer) had 272 cases; and Paterson (Passaic) listed 409 cases with a mortality of 29%.

In Burlington County, one of the physicians attempted to account for the low mortality he enjoyed in those cases which came under his treatment, as follows:

> The writer lays no claim to skill not possessed by others, or to any remedy or marvellous power, but largely to the fact that he recognizes the disease as one admitting of no conservatism. Here temporizing must be discarded, and here the so called expectant treatment means death to the patient and chagrin to the physician. You must attack the disease as you would a rattlesnake, for you are dealing with an enemy almost as deadly and relentless. . . . In first taking charge of a case, a strong point is made of insisting upon complete isolation of the patient; this for the benefit of those not already affected. . . . After attending to the

[62] *Transactions of the Medical Society of New Jersey, 1882*, p. 228.
[63] *Ibid.*, p. 255.
[64] Atlantic, Cumberland, Gloucester, and Morris.

patient, each member of the household is subjected to treatment as follows: Internally, a teaspoonful of listerine three times daily . . . locally, a gargle of the same dilated with water. . . . When these instructions are faithfully carried out, many escape the disease altogether, or if attacked it is less severe in its nature.[65]

Mercer County was the only county referring to the disease in 1902, and its report contained the first (and only), comments concerning the use of anti-toxin. One physician of the district had used it on 23 patients without ill effect, and with the result of hastening recovery in every instance. In a second report, entitled "The Results of the Use of Anti-toxin in Cases of Diphtheria Reported to the Health Board," it was reported that between June 1, 1896 and May 1, 1899, there were 318 cases treated with anti-toxin, 36 of whom died. In 122 cases which were not so treated, 35 died, a rate 2½ times greater than the former.

The year 1912 was reported by seven counties, and of these, only Atlantic County mentioned the treating of a few cases, with no epidemics anywhere in the county. With this report, diphtheria disappeared from the many subsequent county reports in the period under survey.

Typhoid Fever

Primitive living conditions, and the lack of adequate sanitary and sewerage facilities provided ideal conditions for the propagation and persistence of this disease. It was probably more prevalent in the 17th and subsequent centuries in the colonies than records would indicate, for it was confused with other fevers, and was generally not accepted as a clinical entity until some time in the 19th century.[66]

In the surveys of 1822, three of the six reporting colonies referred to the epidemic occurrence of typhoid type fevers, with many fatalities. In Sussex County, the fall months were attended by fevers which were more "obstinate" and generally of the "typhoid type." Hunterdon County experienced a similar, continued, bilious fever, which was only moderately fatal. It prevailed in the months of January and February.

The surveys of 1832, 1842, 1852, and all but Hunterdon County in 1861, were without mention of epidemics. The excepted county had many sporadic cases, though apparently of greater virulence than formerly, in proportion to the number attacked.

[65] *Transactions of the Medical Society of New Jersey, 1892*, pp. 231-233.

[66] Typhoid was very common in the Old World, and was frequently confused with typhus, cholera, "diarrhea," and other diseases where gastro-intestinal manifestations complicated the diagnosis.

In the year 1872, six counties noted this ailment, one to note its absence,[67] four to indicate moderate frequency and mortality,[68] and one to report epidemic conditions.[69]

In 1882, however, typhoid was present in eleven of sixteen counties, with five [70] treating but few cases, and one (Essex) indicating an increased incidence. In Mercer County, "In every instance these could be traced to local causes—such as stagnant water with vegetable decomposition, and, in one case, imperfect sewerage was the cause." [71] Somerset also traced several cases to defective sewerage, and contamination by waste vegetable matter.

In the counties which reported typhoid in epidemic proportions, Warren was severely attacked, coincident with an epidemic of malarial disease. Hunterdon's Delaware Valley settlers also suffered its ravages, and New Brunswick, in Middlesex County, had many cases attributed to "water used from pumps." A few cases were treated near the sewer basin, and the Reporter commented, "The fact that so much of the sewerage of New Brunswick empties into slack water, is deleterious to the health of the city." [72] In Ocean County, the survey stated that the number of cases was four or five times any one of the previous nine years, in the experience of the Reporter.

The Reporter of Hudson County contributed a discussion of the believed cause of this fever, which illustrates the conflict of ideas held by the physicians of the period. He recalled, that early in the preceding summer, it rained steadily for two weeks, during which the vegetation grew luxuriantly, particularly the water plants of the marshes. This was followed by a period of dry, hot weather, and in September there was a second rainy period. He continued:

> . . . and then began a siege of typhoid and other continued and remittent fevers, as well as the whole list of filth diseases. All classes were attacked, the only preference seeming to be for the young. Much importance was given to sewer gas and improper plumbing, and, in many instances, perhaps rightly. But the popular craze

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[67] Warren.

[68] Sussex, Passaic, Mercer, and Monmouth.

[69] Hunterdon.

[70] Cumberland, Mercer, Morris, Sussex, and Somerset.

[71] *Transactions of the Medical Society of New Jersey, 1882*, p. 223. Although this fever was clearly recognized to be epidemic in occurrence, it was not until after 1849 that the evidence for the spread of the disease became recognized, following the work of John Snow on the cause of the spread of cholera.

[72] *Ibid.*, p. 227.

which puts all the blame on defective (?) plumbing found little support. It is many years since so many mortal fevers have been endemic.[73]

In 1892, fourteen of the State's twenty-one counties reported the disease. Most of these had few cases, with many communities noting its complete absence. Somerset County had only one case, and in Camden County, ten of eighteen reporting physicians had no cases, while the remainder had only a few, with no deaths. Bergen County had cases in Englewood, which were blamed on the drinking of impure water. The Reporter added, "A system of river water supply has been introduced into the place, and a thorough sewerage outfit placed."[74] Trenton (Mercer) considered itself particularly free of the disease with only 40 cases reported to the Trenton Board of Health. New Brunswick (Middlesex) reported 16 cases; Paterson (Passaic) had 72 cases, with a mortality of 20%; and in Newark (Essex), there were 609 cases in the year 1891, which was an increase of 250 cases over the previous year. In Burlington County, where there were many deaths, these were attributed by one physician, in many cases, ". . . to bad nursing; by the way a not infrequent cause of death in this as in other grave affections."[75]

The years 1902 and 1912 saw the last reports of typhoid in their surveys, all in sporadic cases. Burlington attributed its cases to the pollution of the Delaware River, from which the town of Bordentown secured its water. Hunterdon also had cases in the Delaware Valley, and Trenton in Mercer County had 90 cases in the year ending June 1, 1902. The Atlantic County report of 5 cases in 1912, and the report from Essex County claiming the honor of leading the State in the low mortality of typhoid cases in the same year, were the last to mention typhoid. It too, therefore, appeared to have lost its place among those diseases which continued to resist efforts of the profession to control and eradicate them.

Typhus Fever

Typhus fever was known by several names, among them "ship-fever," "camp-fever," and "jail-fever."[76] These serve to suggest the role the disease played in the lives of the colonists of America. The failure of physicians of both Worlds to distinguish this fever from typhoid and other fevers, probably accounts for the few references to it, by name, in

[73] *Ibid.*, p. 219.
[74] *Transactions of the Medical Society of New Jersey, 1892*, p. 225.
[75] *Ibid.*, p. 229.
[76] It was also called malignant or putrid fever.

the surveys being studied. It was widely prevalent in the eighteenth century, and Toner [77] lists twenty-two epidemics in several localities in New England, in ten separate years. It may be assumed that many of the cases of "continued" fever noted in the various reports, may have been typhus.

There were four county reports in the entire survey period which noted this fever, three of them in 1822. Salem County, in that year, reported cases at the beginning of the year. They were apparently neither severe nor widespread, for they received little comment. In Salem County, the fever began about the middle of July and persisted until the beginning of October. Treatment was that generally used for other fevers, most of which were intermittent and remittent in type. Essex County was the only county to report it epidemic. The south-east portion of Orange, and principally Union Township, had an epidemic of this fever during the late summer and early fall. The report concluded, that the attack was, ". . . from common report, most distressing and fatal."

The final mention of the disease was the report of Morris County in 1882, in which it received comment because of its absence during the year.

Dysentery and Diarrhea

These two ailments were commonly recognized in the Old World during the 17th and 18th centuries, and they accompanied the settlers to their new homes.[78] Diarrhea was considered a separate entity by many, and this served to confuse the study and diagnosis of the various diseases which presented it as a symptom.[79]

Three counties [80] reported dysentery in 1822, though not in epidemic form. Deckertown, in Sussex County, had a mortal epidemic the previous year, and Hunterdon County reported an epidemic which began in May and continued through October. The Reporter of the latter county stated it was treated most successfully by moderate purging with rhubarb, sulphate of magnesia and castor oil. Concerning these treatments, he continued:

[77] Toner, *op. cit.*, p. 95.

[78] *Ibid.*; Toner lists 34 epidemic years of dysentery in various communities in the colonies, including reference to its prevalence throughout North America in 1752 and 1758. There was no mention of New Jersey.

[79] Dysentery was distinguished from "cholera" in the 17th and 18th centuries, by the presence of bile-staining of vomitus or feces in the latter. (Mettler, *op. cit.*, p. 400.)

[80] Essex, Cumberland, and Sussex.

I believe we err in purging too much in this disease, and to this cause I attribute in a great measure, the mortality attending its march . . . the dysentery seldom proves fatal in very young subjects, provided its management be left to nature. On the contrary, how fatal does the disease prove under the direction of the art! The more I see of this disease the more I am convinced of the imbicility of art in its removal. Taking an extreme view of the disease under its various plans of treatment, I am constrained from their results to acknowledge that we are yet in the dark with respect to its pathology.[81]

Ten years later, in 1832, dysentery was not reported in the single survey submitted, and in 1842, Essex County, also the only county reporting, indicated that the county was remarkably free from the disease which ordinarily prevailed quite extensively.

In 1852, four of the six counties noted considerable dysentery, with many fatalities. Diarrhea existed with the dysentery in Gloucester County, and these two diseases were reported to have apparently replaced cholera as the most serious and fatal disease of children. The summer months were the most serious in Hunterdon County, and diarrhea was epidemic. There, in addition, most of the cases showed symptoms of a "typhoid nature," and in these instances, ". . . if the disease was not checked, very frequently the patient would die in three or four days from exhaustion."[82]

The same report contained observations by the Reporter, on the cause of these cases and its spread:

Your Committee are not sufficiently well acquainted with the topography of Hunterdon County to offer an opinion as to which of the many causes assigned for the production of dysentery of a typhoid type may have tended to excite or influence its appearance; but they would respectfully allude to the long drought and excessive dry weather: 1st, as causing miasma to arise from any stagnant pool or marshy land, or the banks of a stream usually covered with running water; 2d, tending to deteriorate the water used for drinking; 3d, the great care necessary in removing and carefully putting away the evacuations of the first patients; and 4th, the constant action of the dry atmosphere on the surface of the body, causing an undue evaporation of the serous fluid, a greater density of the circulating medium, and consequent turgescence of the vessels and congestion of the internal organs, all tending to influence the system to the disease.[83]

Dysentery existed for a brief period in Camden County, in 1861, and was frequent in two others. In Hunterdon County, "Few persons escaped a visitation." At the following survey period, however, there

[81] *The Rise, Minutes, and Proceedings . . .* (Transactions of 1822), p. 213.
[82] *Ibid.*, p. 539. (Transactions of 1852.)
[83] *Ibid.*, p. 540.

appeared to have been a marked decline in incidence. Only two [84] of fifteen counties reported cases, and all of these were called diarrhea.

Ten years later (1882), diseases of the alimentary tract were infrequent in three counties [85] while two others [86] had many cases. In Passaic County, the Reporter attributed an epidemic of dysentery in Paterson, to contaminated well water. He wrote: "Almost every pump and well is located on the sidewalk near the curbing, which secures, beyond a chance of failure, a more or less copious drainage of surface and gutter water into the well." [87]

In Bergen County (1882), an unusual amount of intestinal illness was met with during the summer, in persons who used milk as a principal food. Infants were particularly afflicted, and the only remedy which proved successful, was the complete elimination of milk from the diet. The Reporter further remarked: "This form of disease was no doubt due in a great measure to the drought and consequent scarsity of pasture, the cattle being obliged to subsist on weeds, bushes and the like, which injured the quality of the milk." [88]

Although all counties of the State were represented in 1892, only Hunterdon County noted the disease, reporting its relative infrequency during the summer and fall, as compared with previous years. This was the last reference to these diseases.

Cholera

Cholera does not appear to have been as prevalent or troublesome as the diseases previously considered, for it was only occasionally mentioned in the various surveys. Among children, however, it was perhaps the most frequent cause of mortality in both the New and Old Worlds, until the end of the nineteenth century.[89]

[84] Bergen and Passaic.
[85] Essex, Morris, and Ocean.
[86] Passaic and Cumberland.
[87] *Transactions of the Medical Society of New Jersey, 1882*, p. 239.
[88] *Ibid.*, p. 196.
[89] Asiatic cholera, which wrought widespread havoc among the peoples of the Old World, was reported in America at various times after 1832, having entered through Quebec and New York. The "cholera" reported here, however, while perhaps including undifferentiated cases caused by *Vibrio comma*, more often described cases of gastro-intestinal illness characterized predominantly by diarrhea. It was recognized in two forms, cholera infantum or the "summer complaint" of infants and young children, and cholera morbus which attacked older children and adults. Both illnesses were attended by severe diarrhea, and had a high mortality. (See also n. 71, p. 30.)

In 1822, only Hunterdon County reported cases of cholera, all during the month of September. The disease went unmentioned in 1832, and in the next survey of 1842, Essex County, particularly the city of Newark, was stated to have been markedly free of cholera infantum during that year. In 1852, it was again not referred to in the six county reports submitted.

Hunterdon County suffered a marked increase in the number of cases of cholera morbus, in 1861, and cholera infantum prevailed to a considerable extent among children in Sussex County, the same year. This was likewise the case in Bergen County in 1872; in Camden County, however, cholera infantum had so decreased in incidence that it was scarsely seen.

Cholera was mentioned in three reports [90] in 1882, and one [91] in 1892, which were the last reference to this disease in the survey.

Smallpox

Smallpox was responsible for decimating entire communities and tribes of Indians, following the landing of the first settlers on the Continent, having been brought with them from the Old World, where it had been known and described for centuries.[92] Toner [93] recorded its presence in epidemic form, in New Jersey, in 1730, 1752 and 1764.

In spite of this former prevalence, and only limited application of the principles of inoculation and vaccination after their introduction from Europe,[94] the disease did not appear in the surveys until 1842, when Essex County had a number of cases, with many deaths. There was no mention of the disease in the surveys of 1852 and 1861.

In 1872, eleven of fifteen counties reported numerous cases, most of which were traced to Philadelphia, where a serious epidemic was rampant.

[90] Essex, Cumberland, and Salem.

[91] Middlesex.

[92] Despite its antiquity, smallpox was not regularly distinguished from other eruptive fevers (including measles and chickenpox), until the end of the 17th century. During the 18th century, though still not clearly understood, several varieties were recognized, and it began to be separated from those conditions which it resembled during various phases it assumed.

[93] Toner, op. cit., p. 94. He also listed 59 additional epidemics in the colonies, from 1618 to the beginning of the nineteenth century.

[94] Inoculation (variolation) was first performed in America in 1721, by Dr. Zabdiel Boylston, two months after its introduction into England, and met with incredible opposition. Jenner made his announcement of the efficacy of vaccination in 1798, but it was not performed in the U. S. until 1800, when Dr. Benjamin Waterhouse, then Professor of Medicine at Harvard, vaccinated his son with vaccine brought from England.

The Reporter of Burlington County gave the first information of the degree of acceptance of vaccination by the populace. With the first outbreaks in the county, they were warned to take protective measures, and ". . . in October, Vaccinia became the voluntary and popular epidemic." [95] Five other counties [96] had many cases in the cities where the disease had an opportunity to spread among the unvaccinated.

In Camden, smallpox made its appearance in a district of the city inhabited mostly by colored families. Despite a clean-up campaign by the city "sanitary committee," attempting to remove some of the poor sanitary conditions in the area, the disease spread to the surrounding districts. The number of cases became so great that it was necessary to open a smallpox hospital to care for them. There were 133 cases at the time of reporting, with a mortality of 18%. There were 104 additional cases treated by physicians at home, with a mortality of 16%. Mortality among the unvaccinated was 34%, which was a little more than half of the rate among this same group at a smallpox hospital in Philadelphia.[97] Concerning vaccination, the Reporter wrote:

> Notwithstanding all that has been said and written on the protective power of vaccination, it must be confessed that there is still a great prejudice against it, especially among the less intelligent part of the population. Vaccination was freely offered to all who were unable to make the pecuniary compensation for it, by the city authorities, yet many refused to avail themselves of the offer. . . .[98]

In Newark (Essex), there were 930 cases during the period May 1, 1871 to April 26, 1872, with 120 fatalities. The report from Hudson County indicated that the disease had spread from Hoboken, where it had prevailed widely the previous year. Few parts of the county escaped. Jersey City had established a smallpox hospital to treat the large number of cases. Trenton, in Mercer County, suffered a widespread epidemic which began in July. It first made its appearance in the central part of the city, in the most thickly populated portion, and "among the better class of citizens." In spite of immediate precautionary measures by the Board of Health, it gradually spread to almost every part of the city. Special arrangements were made throughout the city to administer vaccination, and the residents appeared by the hundreds to be protected. The

[95] *Transactions of the Medical Society of New Jersey, 1872*, p. 242.

[96] Cape May, Cumberland, Gloucester, Middlesex, and Warren.

[97] Philadelphia recorded 1000 deaths in the month of December alone. An estimate made by the Reporter of Camden indicated that about 1000 cases had occurred during the year in a population near 23,000, with 157 deaths.

[98] *Transactions of the Medical Society of New Jersey, 1872*, p. 248.

epidemic was eventually brought under control, but it took a heavy toll of lives, for fatalities occurred in about 1 of every 6 attacked.

The Passaic County report contained similar evidence that vaccination lacked the full support of the public. The Reporter stated:

> There has been a great neglect of proper vaccination among our citizens, and although for the past four months many have been frightened into appreciating its value and necessity, still a large portion of our population is practically unprotected. Possibly our profession may be somewhat to blame for this, as its teachings and practice on this point have not been certain and uniform; some undervaluing its repetition, and others performing it too frequently. Medical opinion seems now to be settling down to the conclusion, that successful vaccination in infancy, successfully repeated at or soon after the age of puberty, is requisite for protection against smallpox.[99]

In 1882, smallpox led the diseases in three [100] counties, but the situation was much different. Trenton had only 16 cases, and Paterson, in Passaic County, had but 11 cases in the previous two and one-half years. Somerset and Warren Counties had a few cases, but no epidemics in spite of epidemics in nearby Easton and Bethlehem, in Pennsylvania. Morris County reported a complete absence of cases during the previous year.

In 1892, with all counties of the State represented, only Mercer and Essex Counties had cases to report. Four [101] other counties had either occasional cases, or none at all. In Mercer County, however, Trenton had 104 cases, with 17 deaths. The epidemic was halted by strict quarantine and the vaccination of all school children and others exposed to the disease. The Essex County report, which recorded an invasion of smallpox during the same period, also noted control of the disease by requiring all school children of Newark to undergo compulsory vaccination.

Although the surveys of 1902 contain the last reports of the widespread extent of this disease, it was evident that State-wide compulsory vaccination was still far from being achieved. In Atlantic County, vaccination was rigorously insisted upon in all schools, as well as in the general public, but in Camden County, the Reporter wrote, " How unfortunate it is that, while we have evidence of the power of vaccination before us, our lawmakers will not try to make vaccination compulsory, as it is in that wise, far-seeing country, Germany." [102] The Camden County Medical Society accordingly resolved, " The Camden District Medical Society recommends

[99] *Ibid.*, p. 296.
[100] Burlington, Essex, and Mercer.
[101] Passaic, Somerset, Burlington, and Cumberland.
[102] *Transactions of the Medical Society of New Jersey, 1902*, p. 272.

vaccination as *the* preventative and protection against smallpox, and also that this resolution be published in the daily papers." [103]

From Essex County, the report included the observation, "Smallpox has been rampant, and still shows but few indications of its cessation, a pitiable commentary upon primitive medicine." [104] The last epidemic in the survey period was in Warren County, where 125 cases were treated in Hackettstown, though there were but four deaths.

Chickenpox

Chickenpox may have prevailed widely throughout the State during the period being studied, but it received almost no mention in the many reports examined. Its relatively minor symptoms and low mortality may account for this, at least in part. It is more probable that the disease was not distinguished from mild cases of smallpox and other eruptive fevers.[105]

The first epidemic noted, was in the survey of 1872, in Cumberland County. Similar epidemics were reported in three communities of Morris County in 1882, and the last reports were from three counties [106] in 1892, where it received minor comment.

Measles

In the early colonization of America, measles frequently appeared to ravage the settlers with marked virulence and many deaths, and this occurred at various times during the following two centuries.[107] Except for the survey of 1822, the disease was noted at each survey year, to 1912.

Passaic County was attacked epidemically in several towns by measles in 1832, though it was generally mild,—and dangerous ". . . only by the perverse prejudice and mal-practice of nurses and empirics." [108] In Newton (Sussex), during 1842, it prevailed for over six months, again mild and requiring little attention, ". . . except in cases of imprudent exposure, or where hot toddy, spicy drinks, and the dry, hot air of stove-rooms were employed to drive them out." [109]

In 1852, Mercer County treated many cases during the spring and

[103] *Ibid.*
[104] *Ibid.*, p. 273.
[105] See n. 92, p. 37.
[106] Cumberland, Essex, and Mercer.
[107] Toner, *op. cit.*, p. 95, listed numerous epidemics in Massachusetts, So. Carolina, Philadelphia, Connecticut, New York, and Vermont, during the eighteenth century.
[108] *The Rise, Minutes, and Proceedings . . .* (Transactions of 1832), p. 295.
[109] *Ibid.* (Transactions of 1842), p. 371.

summer which were frequently fatal. Hunterdon County, in 1861, had an epidemic of German measles, confined to children in the public schools. It was mild, but highly contagious.

Seven [110] of fifteen counties reported epidemics in 1872, and German Measles closed the schools in two communities of Somerset and Morris Counties. At the next survey period, in 1882, again seven [111] counties (of all twenty-one counties reporting) reported mild measles throughout their communities, but two saw severe epidemics. Union County treated large numbers of cases, and in Morris County, measles was second only to " la grippe " as the most serious disease encountered during the year. During the same year, German measles was epidemic in five [112] counties of the State.

Bergen and Burlington Counties were the only counties to report the disease in 1902, and in 1912, the Reporting physician numbered himself among the many mild cases which occurred in Morris County.

Miscellaneous Diseases

Throughout the surveys which have been studied, numerous other diseases have received occasional comment by the Reporters of various counties. Influenza was occasionally epidemic in certain parts of the State, as was whooping cough, pneumonia, rheumatism, pleurisy, bronchitis, erysipelas, mumps, tonsilitis, " peritonitis," and " spotted fever." Aside from those which received only minor comment, and did not show progressive advance or decline, most of the above disappeared from the county reports as important causes of illness in the State, early in the twentieth century.

V.

Summary

Our survey, by virtue of imposed limitations of coverage, presents at best, a very incomplete and imperfect picture of the state of health in New Jersey through most of the nineteenth and early twentieth centuries. It may be likened to the impression one would receive of a passing scene observed through an almost closed venetian blind. We have learned, at least, that the malarial-diseases appeared to disappear mysteriously from the State, coincident with a marked decrease in incidence of other illnesses,—some, like typhoid and dysentery, falling to improved sanita-

[110] Essex, Hunterdon, Middlesex, Passaic, Salem, Somersey, and Morris.
[111] Burlington, Camden, Cape May, Essex, Hudson, Middlesex, and Ocean.
[112] Atlantic, Mercer, Middlesex, Monmouth, and Somerset.

tion,—and others, like smallpox, diphtheria, scarlet fever, and measles,—to vaccination, isolation, and immunization. During this same period, the profession successfully organized its ranks, controlled its educational and ethical standards, regulated licensing, and saw unbelievable enlightenment and extension of its body of medical knowledge.

Whatever the factors responsible may have been, the period of our survey saw a most significant confirmation of the statement of a Reporter of Cumberland County, in 1861, who, in writing of malarial fevers, said, "With the march of civilization and improvements, so fade away, one by one, the diseases of our fathers." [113]

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[113] *Transactions of the Medical Society of New Jersey, 1861,* p. 113.

CLASS DISTINCTION IN MEDICAL PRACTICE: A PIECE OF ANCIENT EVIDENCE

T. A. SINCLAIR

When a history of medical etiquette comes next to be written, two passages in Plato's *Laws* (IV 720 and IX 857) may be useful as evidence for the practice in Athens in the fourth century B. C. True, one does not generally look to Plato for historical fact, but in this case there is no need to be suspicious; what he says comes quite incidentally into one of his many comparisons between the art of healing and the art of governing. The point of the comparison here is that a legislator or a legislature ought to make laws intelligible, and therefore acceptable to citizens, and not simply issue commands like a dictator. Plato lays it down that they should proceed as do high-class physicians treating patients of their own class, not as the inferior sort of physicians treating persons of the servant class.

There were then two classes of doctors as well as two classes of patients. Moreover, there were two different ways of dealing with patients, two attitudes towards medical science and two professional standards. Generally speaking, it seems from Plato's words, the physician proper attended the free patients, the assistant, who might be either slave or free (720 b 2), looked after the slave patients, either visiting them in their master's houses or receiving them in the surgery. These apprentice- or assistant-doctors had not studied medicine scientifically like their masters, but by constant association with scientific physicians in practice they had, by observation and instruction, acquired much knowledge of treatment and cures, and could work empirically. They simply told the patient what he must do, gave him no account of what was wrong with him, and did not even ask him for an account of himself. There was no time for talk; he had to get through a lot of slave-patients so as to relieve his master of this kind of work. Meanwhile the great man himself, the gentleman-doctor, whose method is to examine every fresh case anew, treats patients who are his social and intellectual equals. He discusses with them, and with the members of the household, the origin and nature of the disease. He does not impose a regime upon a patient without hearing what he has

to say himself: he uses persuasion to win his consent and does not behave like an autocrat. He thinks it part of his duty to explain things and so improve the patient's education.

This is a clear case of one medical service for one class and another for the other, of a doctor-patient relationship which, in the one case, has a more than purely medical value, and another which lacks almost everything. But the evidence must not be pressed beyond what it says. It says nothing about doctors' fees; it does not mention the possibility that valued slaves in a wealthy household might be treated by their master's physician, nor the probability that poor people who were citizens, not slaves, might have to be content with the inferior service. Nor is anything said about a well-known practice in some cities of appointing an official (δημόσιος) physician. Plato's parallel was with classes of doctors, not classes of patient; he was concerned not so much with social distinctions as with the distinction in medical practice, to which almost a hundred years ago the Platonic commentator, G. Stallbaum, called attention—*hoc medicae factitandae discrimen . . . quod nec hodie sublatum esse constat.*

MEDICO-HISTORICAL NEWS AND ACTIVITIES

CORRESPONDENCE AND REPORTS

THE STUDY OF THE HISTORY OF MEDICINE IN DENMARK

A Short Survey

BY

EDV. GOTFREDSEN *

The Chair.

At the University of Copenhagen the history of medicine has been taught since 1802, although with many interruptions. It was the professors of the university who occasionally lectured on the history of their disciplines or gave a general view of the historical development of medicine. Regular teaching, however, could not be begun before a special chair was set up. The first professor of the history of medicine in the University of Copenhagen was Julius Petersen (1840-1912). He was appointed lecturer in 1889, and, in 1893, rose to the rank of professor. Julius Petersen, who was a most learned man and an assiduous writer also, contributed several valuable works, especially on the history of Danish medicine. He also wrote a very readable survey of the historical development of medical therapy which was translated into German (1).

Julius Petersen's successor, Vilhelm Maar (1871-1940), was appointed lecturer in 1911 and made professor in 1916. He did not write much himself but, being endowed with a good critical sense, he was an able editor of old medical works. Of international importance are his editions of the scientific works of Nicolaus Steno with an introduction in English (2), and the autobiography of Jacques Bénigne Winslow with an introduction in French (3). When Maar retired in 1933, the chair remained vacant for ten years. In 1943 a lectureship was given to Edvard Gotfredsen (born 1899); he was made professor in 1949.

Medico-Historical Theses for the Doctorate.

In Denmark the license for practising medicine is acquired by passing a state-examination, while the doctorate is a purely academic degree. In the course of time a number of medical men received the degree of doctor for their medico-historical theses. Thus Andreas Frederik Bremer (1810-57), in 1836, defended a dissertation on Paracelsus (4). Daniel Cold (1827-1902), in 1858, presented a thesis on the physicians and the sanitary system at the time of King Christian IV (1588-1648) (5). Johan Carlsen (1850-1919), in 1890, wrote on the history of

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* Dr. Edv. Gotfredsen, Professor of the History of Medicine at the University of Copenhagen, kindly prepared this survey upon our request. We are glad to bring it before the readers of the *Bulletin*, and wish to express our gratitude to Professor Gotfredsen for his courtesy.—Ed.

diphtheria in Denmark and Germany (6). Julius Wiberg (1860-1941), in 1910, gave a general view of the prolific writings of Galen (7). Axel Hansen (1884-1945), in 1928, graduated by virtue of a thesis on the history of chlorosis in Europe (8). Vilhelm Møller-Christensen (born 1903), in 1938, acquired his degree with a dissertation on the history of the surgical forceps (9). Edvard Gotfredsen's thesis, published 1942, dealt with the ancient theories of the heart, the vessels and the pulse (10). Børre Johansson (1911-45) wrote on the history of the Danish statistics for diseases and causes of death. His thesis was published posthumously in 1946 (11). Eyvind Bastholm (born 1904) took his doctor's degree with a work on the history of muscle physiology (12). Two outstanding scholars who did not write theses had the degree of honorary doctor conferred upon them for excellent works in the medical-historical field. The first was Vilhelm Ingerslev (1835-1918), a country doctor, who, in 1873, gave a full account of the history of Danish medicine from the earliest times to the year 1800 (13). He was made doctor honoris causa in 1894, and his work is still extensively used. The other honorary doctor was Kristian Carøe (1851-1921), a general practitioner in Copenhagen, who, from 1904 to 1909, published the now quite indispensable work, *Den danske Lægestand 1479-1900* (The Danish Medical Profession 1479-1900), in four volumes containing biographical details of all Danish physicians and surgeons from the foundation of the university in 1479 to the year 1900 (14). Carøe was made doctor in 1921 but died a few months later.

The theses bear testimony to the research work done on the history of medicine, but they only form a small part of the Danish medico-historical literature. The present author regrets that lack of space prevents him from mentioning many other valuable contributions. A few works are dealt with in the following sections, and in *The Humanities and the Sciences in Denmark during the Second World War* (Copenhagen 1948) the main publications treating of medical history from 1939 to 1945 are enumerated. Two other useful works, written in English, may be mentioned. Knud Faber: *Nosography in Modern Internal Medicine* (New York 1923; 2nd ed. 1930) being a history of the development of modern internal medicine. Valdemar Meisen: *Prominent Danish Scientists through the Ages* (Copenhagen-London 1932) containing forty-five short biographies of Danish scientists and medical men from the middle-ages to the present time.

The Medico-Historical Museum.

The Medico-Historical Museum of the University of Copenhagen was founded in 1907 as a private institution, and, in 1918, bestowed on the university. The founders were three professional men, highly interested in the history of medicine, viz. Kristian Carøe, mentioned above, another general practitioner, John W. S. Johnsson (1868-1929), and Carl Jul. Salomonsen (1847-1924), who was professor of general pathology.

The museum, now headed by the professor of the history of medicine, is housed in a historic building, the former Royal Surgical Academy, founded in 1785 and abolished in 1842. The main building contains twenty-eight rooms, filled with old surgical instruments, obsolete hospital equipment, restraint chairs for lunatics, old microscopes and spectacles, amulets and votive offerings, medals and coins, paintings and engravings, drawings and photographs, books and manuscripts, etc. A

gallery serves to accommodate the large collection of X-ray tubes, including every possible design. Another gallery accommodates dental chairs and instruments, illustrating the development of dentistry. The rooms are grouped around a central amphitheatre, the old lecture theatre, with seats for two hundred persons. It has been left unchanged since 1787, when it was first taken into use.

A whole house, the former Physiological Institute, standing on the other side of the courtyard, is devoted to the history of pharmacy. In the thirteen rooms of this building almost everything used by old apothecaries is to be seen: a fine collection of drug jars, some of them bearing the names of famous drugs, such as "Mumia vera" and "Theriaca Andromachi," old fashioned retorts, ponderous mortars, pill-machines of many various shapes and constructions, travelling medicine chests, some of them from the Royal House, and much more. The premises of some apothecaries of the eighteenth and early nineteenth centuries are reconstructed with the original counters and shelves, jars and bottles, and everything else (15).

The Danish Medico-Historical Society.

The Danish Medico-Historical Society, founded in 1917, is, at the present time, one of the greatest associations of this kind in the world, numbering on its mailing list no less than 586 members. The members are physicians, apothecaries, and some other interested persons. During the winter season five to six meetings are held, and in the summer time, if possible, an excursion is arranged. The speakers are not exclusively recruited from among the members; the Society, wishing to maintain a broad outlook, now and then invites a scientist or a humanist to read a paper. Nor are the speakers exclusively Danish; from time to time the members have the pleasure of hearing a prominent historian from abroad. Before World War II, Max Neuburger of Vienna, and Walter von Brunn of Leipzig, spoke to the Danish Society. After the war papers were read by Douglas Guthrie, Edinburgh; Robin Fåhraeus, Uppsala; Birger Strandell, Stockholm; Erick Hintzsche, Bern; C. A. Westerblad, Lund; and Henry E. Sigerist, Pura.

The Society, possessing no organ of its own, buys medico-historical books and reprints direct from the publishers; twice a year the members receive a package, the value of which greatly surpasses the amount of the annual subscription.

In 1939 the Society instituted two prizes, one for an essay on medicine in medieval Denmark, another for a review of the mental state of King Christian II (1481-1559). The first prize had to be divided into two, one half being awarded to Vilhelm Møller-Christensen (16) another to Eyvind Bastholm (17). The second prize was awarded to Paul J. Reiter (18).

In addition to the Society, there also exists a smaller circle, The Friends of the Medico-Historical Museum, founded in 1928, by the late Chr. I. Baastrup. The scope of this association is to support the museum in every way possible. In the course of time, this circle has done many a good deed for the benefit of the museum, speaking to the authorities, securing money, etc.

Palæopathology.

The excavations and examinations of skeletons from ancient times form an interesting chapter of the Danish medico-historical activities. At the beginning of

this century, Hans Andreas Nielsen (1850-1932) dug out a large number of skeletons from the Stone Age and Iron Age. He was especially interested in anthropology but also described the various pathological conditions found in the bones, viz. fractures and other lesions, arthritis, osteomyelitis, rickets, hydrocephalus, dental caries, vesical calculi, etc. A number of trepanned skulls also were exhumed (19). This work was continued by Knud Fischer-Møller (1872-1942), and is now in the hands of Kurt Brøste (born 1902), who is head of an anthropological section in the Anatomical Institute of the University.

The late Frederik Carl Christian Hansen (1870-1934), professor of anatomy, was deeply interested in this matter too. In 1915, together with his Swedish colleague, Carl Magnus Fürst (1854-1935), he published the great anthropological work *Crania Groenlandica* (20) in which four hundred Eskimo skulls from Greenland are treated. Hansen alone, in 1924, published another big work, *Anthropologia Medico-Historica Groenlandicae Antiquae* (21), containing an account of the skeletons exhumed in the medieval Norse cemetery of Herjolfsnes, South Greenland. Moreover, he examined the oldest tombs of kings and bishops (11th to 13th century) in Roskilde Cathedral, described the physical defects found in the bones, and tried to reconstruct the faces on the basis of the skulls (22).

When, in 1912, the Danish National Museum started to excavate the foundations of the old monastery of Øm (founded, 1172; abolished, 1560) in the peninsula of Jutland, a large number of skeletons and some surgical instruments were revealed. They were carefully examined by Kristen Isager (1864-1943), who, in 1936, published a Danish account, translated into German in 1941 (23). In the more than five hundred skeletons examined, Isager found twenty-four cases of osteomyelitis and several cases of tuberculosis of the bones and joints. Many of the bones presented marks of arthritis of various types, and six grown-up persons and a child of the age of ten had been suffering from syphilis. The surgical instruments were knives, forceps, needles and fleams for blood-letting. Skeletons as well as instruments are now exhibited in a small museum standing on the site of the old monastery.

Another monastery, the Aebelholt Kloster in Seeland, was excavated, in 1935 and the following years, by Vilhelm Møller-Christensen. Here, too, a great number of skeletons and instruments were exhumed. Collaborating with the former professor of pathological anatomy, Poul Møller, Møller-Christensen presented a preliminary report in 1943 (24), but a full account of these most interesting finds is still waited for. At the present time, Møller-Christensen is engaged in digging out the burial-ground of a leper asylum from the middle-ages.

Periodicals.

The first Danish periodical on the history of medicine was the *Archiv for Lægevidenskabens Historie i Danmark* (Archive of the Medical Science in Denmark), published in 1823 by Johan Daniel Herholdt (1764-1836), the first professor of physiology in the University of Copenhagen. Twelve years later, in 1835, Herholdt, in collaboration with Frederik Vilhelm Mansa (1794-1879), a military physician, published *Samlinger til den Danske Medicinal-Historie* (Collections on the History of Danish Medicine). The time, however, was not ripe for periodicals of that kind, and neither of them appeared in more than one volume. Professor

Maar edited a collection of medico-historical papers, which, from 1912 to 1917, appeared in eighteen booklets (25), containing much valuable information, but the majority of the medico-historical papers appeared in the general medical journals. In 1942 the University Library started the publication of *Acta Historica Scientiarum Naturalium et Medicinalium*. This fine series is intended to embody longer papers on the history of science and medicine; till now seven volumes have been issued. In 1948 the Association of Danish Medicine Manufacturers began publishing *Medicinsk Forum* (Forum Medicum). This publication appears in ten numbers annually, distributed free of charge to every doctor and apothecary in Denmark. Containing both a modern and a historical section, and richly illustrated, *Medicinsk Forum* is highly appreciated. No advertisements are allowed, and all references to special drugs are avoided. In 1950 the chief librarian of the University Library (Scientific and Medical Department), Jean Anker, Ph. D., initiated *Centaurus*, an International Magazine of the History of Science and Medicine, written in English, French and German. Co-editors being secured everywhere in the world, *Centaurus* is quite certain to become a valuable instrument for the historians of science and medicine.

NOTES

1. *Hauptmomente in der geschichtlichen Entwickelung der medicinischen Therapie.* Kopenhagen, 1877. 400 pp.
2. *Nicolai Stenonis Opera Philosophica*, edited by Vilhelm Maar. 2 vols. Copenhagen, 1910. Folio. 264 + 365 pp.
3. *L'autobiographie de J. B. Winslow*, publiée par Vilhelm Maar. Paris-Copenhague, 1912. 181 pp.
4. *De vita et opinionibus Theophrasti Paracelsi.* Hauniae, 1836. 191 pp.
5. *Lægevæsnet og Lægerne under Christian IVs Regering.* København, 1858. 156 pp. (Danish.)
6. *Bidrag til Difteriens Historie i Danmark og Tyskland.* København, 1890. 287 pp. (Danish.)
7. *Galen og den galenske Lægevidenskab og Lægekunst.* Odense, 1910. 243 pp. (Danish.)
8. *Om Chlorosens, den ægte Blegsots Optræden i Europa gennem Tiderne.* Kolding, 1928. xxviii + 202 + xviii pp. (Danish.)
9. *The History of the Forceps.* An investigation on the occurrence, evolution and use of the forceps from prehistoric time to the present day. Copenhagen-London, 1938. xix + 298 pp. Ill. (English with a summary in Danish.)
10. *Oldtidens Lære om Hjerte, Kar og Puls.* København, 1942. (Acta Historica Scientiarum Naturalium et Medicinalium Vol. I). 332 pp. (Danish with a summary in German.)
11. Den danske Sygdoms-og Dødsårsagsstatistik med et Afsnit om Pneumonistatistik. København 1946. 286 pp. (Danish.)
12. *The History of Muscle Physiology from the Natural Philosophers to Albrecht von Haller.* Copenhagen, 1950 (Acta Historica Scientiarum Naturalium et Medicinalium Vol. VII). 256 pp. Ill. (English with a summary in Danish.)

13. *Danmarks Læger og Lægevæsen fra de ældste Tider indtil Aar 1800.* 2 vols. København, 1873. 585 + 692 pp. (Danish.)
14. *Den danske Lægestand 1479-1900.* 4 vols. København-Kristiania, 1904-09. 138 + 86 + 252 + 124 pp. (Danish.)
15. Papers on the Museum: Walter von Brunn: Das medizinhistorische Museum in Kopenhagen. *Münch. Med. Wschr. 81*: 1934, 1436. Douglas Guthrie: The Medico-Historical Museum of Copenhagen. *Medicine Illustrated 3*: 1949, 134. Ida Rich: Einiges vom medizinhistorischen Museum der Universität Kopenhagen. *Arch. Gesch. Med. u. Naturw. 31*: 1938, 61.
16. *Middelalderens Lægekunst i Danmark.* København, 1944. (Acta Historica Scientiarum Naturalium et Medicinalium Vol. III.) 247 pp. Ill. (Danish with an English summary.)
17. *Sygdomme i Danmarks Middelalder.* København, 1942. 160 pp. (Danish.)
18. *Christian II. Personlighed, Sjæleliv og Livsdrama.* København, 1942. 260 pp. Ill. (Danish.)
19. Nielsen's papers may be found in *Aarbog for nordisk Oldkyndighed og Historie* 1906, 1911, 1915. (Danish.)
20. Carl M. Fürst and Fr. C. C. Hansen: *Crania Groenlandica.* A Description of Greenland Eskimo Crania with an Introduction on the Geography and History of Greenland. Copenhagen, 1915. Fol. 234 + lxix pp. + lii plates. (English.)
21. *Anthropologia Medico-Historica Groenlandicae Antiquae I. Herjolfsnes.* 8° 547 pp. + lxxxv plates. (English.) To be found in *Meddelelser om Grønland*, Vol. LXVII. København, 1924.
22. *De ældste Kongegrave og Bispegrave i Roskilde Domkirke.* København, 1914. Fol. 85 pp. + vi plates. (Danish.)
23. *Krankenfürsorge des dänischen Zisterzienserklosters Øm.* Kopenhagen, 1941. 125 pp. Ill.
24. Poul Møller og Vilh. Møller-Christensen: Skeletfund fra Æbelholt Kloster. 17 + iii pp. Ill. *Aarbog for Nordisk Oldkyndighed og Historie* 1943. (Danish with a summary in French.)
25. *Medicinsk-Historiske Smaaskrifter ved Vilhelm Maar.* (Medical-Historical Tracts). København, 1912-17. Ill. (Danish.) 18 booklets generally collected into 3 volumes.

    Vol. I contains:

    1. Finnur Johnsson: Lægekunsten i den nordiske Oldtid. (The Scandinavian Medicine in Antiquity). 1912. 61 pp.
    2. Kristian Carøe: Bøddel og Kirurg (Hangman and Surgeon). 1912. 61 pp.
    3. J. L. Heiberg: Sindssygdom i den classiske Oldtid. (Mental Diseases in Ancient Greece and Rome.) 1913. 75 pp.
    4. Ernest Wickersheimer: Hundegalskab og Strandbade. (Hydrophobia and Baths on the Beach.) 1913. 39 pp.
    5. Søren Hansen: Primitiv Trepanation. (Primitive Trepanation.) 1913. 80 pp.
    6. K. K. K. Lundsgaard: Brillernes Historie. (The History of Spectacles.) 1913. 79 pp.

Vol. II contains:

7. J. W. S. Johnsson: Lidt om Landefarernes og Lægernes Reklame i ældre Tid. (The Advertisements of the Itinerants and the Doctors in Old Times.) 1914. 94 pp.
8. Chr. Barfoed: Haandspaalæggelse. (The Imposition of Hands.) 1914. 88 pp.
9. Carl Jul. Salomonsen: Asklepios' Helligdom paa Kos. (The Temple of Asklepios in Cos.) 1914. 49 pp.
10-11. Felix Platters Ungdomserindringer oversat af Thora Gertz. (Felix Platter: The Recollections of his Youth, translated from the Latin by Thora Gertz.) 1915. 170 pp.
12. Axel Garboe: Enhjørningen. (The Unicorn.) 1915. 119 pp.

Vol. III contains:

13. Jul. Wiberg: Kriselæren i Oldtidens Medicin. (The Doctrine of the Crisis in Ancient Medicine.) 1916. 49 pp.
14. E. Ingerslev: Ambrosius Rhodius og hans Hustru. (Ambrosius Rhodius and his Wife.) 1916. 81 pp.
15. Holger Mygind: Pompejis Vandforsyning. (The Water Supply of Pompeii.) 1916. 82 pp.
16. J. L. Heiberg: Af Lægemidlernes Historie i den classiske Oldtid. (The History of Remedies in Ancient Greece and Rome.) 1917. 104 pp.
17. Hjalmar Helweg: De Sindssyges Paradis. (The Paradise of Lunatics.) 1917. 70 pp.
18. Arthur Christensen: Om Lægekunsten hos Perserne. (The Medicine of Ancient Persia.) 1917. 103 pp.

ANNOUNCEMENTS

NATIONAL NEWS

Chicago

The annual "Nell Snow Talbot Instructorship Award," to be given by the students of the University of Illinois College of Dentistry for excellence in teaching, has been established in honor of Mrs. Talbot who is associate professor of the history of medicine and of dentistry and assistant dean at the College.

New York

Dr. George Rosen, Editor of the *Journal of the History of Medicine and Allied Sciences*, has been appointed professor and head of the Department of Public Health Education at the School of Public Health, Columbia University. The appointment is effective September 1, 1951.

Washington

Mr. Morris C. Leikind has been appointed Chief of the Historical Division, Medical Museum, Armed Forces Institute of Pathology.

Dr. Donald H. Slaughter, Dean of the University of South Dakota School of Medical Sciences, lectured on "The Philosophy of Medical History" before students of the Postgraduate Army Medical School to which he has been appointed consultant (*J.A.M.A.*, vol. 146, June 16, 1951, p. 660).

NEWS FROM ABROAD

Belgium

Professor Tricot-Royer, Honorary President of the International Society of the History of Medicine, who, since 1925, has occupied the chair of the history of medicine at the Catholic University of Louvain, has been granted the status of professor emeritus. He is succeeded in this chair by Dr. F. A. Sondervorst, Secretary General of the International Society (*Archives Internationales d'Histoire des Sciences*, April 1951, p. 568).

Dr. Douglas Guthrie's Visit to Africa

Dr. Douglas Guthrie, Lecturer on History of Medicine at the University of Edinburgh, has recently returned from a four months journey in Africa, from Cape Town to Khartoum. The object of his tour was to stimulate interest in medical history by means of lectures at various cultural centers, and to collect information regarding native African medicine. At the University of Cape Town on January 17, Dr. Guthrie gave an account of "History in Medical Education." This meeting had been arranged jointly by the University, the South African Medical Association, and the Postgraduate Association. Principal Davie, who occupied the chair, referred to the growing interest in the subject and reference was also made to the

" History of Medicine in South Africa," a work which is being written by Colonel Graham Botha at the request of the South African Medical Association. On January 26, in the University of Witwatersrand, Dr. Guthrie dealt with the history of research in a lecture entitled " The Way of the Investigator." Principal Raikes presided. Three days later a lecture on " Lord Lister in the Light of Modern Surgery " was delivered in the hall of the South African Medical Association, under the presidency of Dr. Alice Cox, and this lecture was repeated in the University of Pretoria. The visit to Pretoria was of peculiar interest as it marked the inauguration of a medico-historical library which is in the course of establishment, largely owing to the energies of Dr. L. Klein and Dr. Neil Murray. Dr. Guthrie took occasion to present to the library, which is intended for South Africa in general and not merely for Pretoria, a copy of the 4th edition of Sir Thomas Browne's *Religio Medici*, and he spoke of the widespread influence of this work. Other lectures were delivered by Dr. Guthrie at the General Hospital of Bulawayo (February 5), before the Nairobi Branch of the British Medical Association (March 2), and at Mengo Hospital, Kampala. He addressed the medical students of Makerere College, where Dr. Alexander Galloway is Dean of the Medical School, on " Responsibility in Medicine." The tour came to an end at Khartoum, where on April 5, Dr. Guthrie lectured on " Lord Lister " to the local branch of the B.M.A.

INSTITUTE OF THE HISTORY OF MEDICINE

The Institute of the History of Medicine, The Johns Hopkins University, announces the award of three fellowships in the History of Science and of Medicine for the academic year 1951-1952. The awards, each of which carries a stipend of $3,000, involve no formal obligations other than residence; and provide for associations with appropriate staff members of the Medical Institutions and of the School of Higher Studies. Those receiving the fellowships for next year are Mr. John B. Blake, of Harvard (in the history of public health); Mr. R. Gordon Gilbert, of the University of California (in the history of basic scientific concepts); and Mr. Rashi Fein, of Johns Hopkins University (in medical economics).

The Institute also announces the appointment of Professor Alexandre Koyré, of L'Ecole Practique des Hautes Etudes in Paris, as Visiting Professor in the History of Science for the first semester, 1951-1952.

RICHARD H. SHRYOCK,
Director.

August 13, 1951.

BOOK REVIEWS

F. Sherwood Taylor. *The Alchemists, Founders of Modern Chemistry.* New York: Henry Schuman, 1949. x + 246 pp. Ill. $4.00.

There has been hitherto no satisfactory general account of this subject. We have had several examples of the alchemist's history of alchemy, accepting as fact the myths and legends with which the movement was so heavily encrusted. We have had also many examples of the specialist's history of alchemy, expert studies of limited periods or fields—Berthelot and Taylor on the Greek development, Davis and Wu and Dubs on the Chinese, Ruska and Holmyard and Kraus on the Arabic. Even John Read's *Prelude to Chemistry* is really a special study of the European development from about the 13th century to the 18th; he is informed and fairly critical as to the earlier periods but reduces his account of them to a mere sketch.

Superior to any predecessor is the present survey, critical in its judgments, comprehensive in its scope, skillful in its narrative and expository art. Avowedly, of course, it is selective. No one in 250 pages can touch on everything, and specialists in particular periods or phases of the subject may miss some of their favorite illustrative passages or incidents. This is inevitable. But the selection is prudently managed, and most of the significant aspects are covered.

It is as a chemist's history of alchemy, however, that the work stands out. From the first chapter to the last, every recipe susceptible of such interpretation is explained in modern terms. The ingredients called for are identified as modern chemicals (though often far from pure), the apparatus needed is described and frequently is illustrated, and the outcome of the process is estimated from a chemist's point of view. The results fall into two broad categories, the plausible and the incomprehensible. Of the former consider an example on page 35: "The product would contain about 66% of gold, 33% of an alloy of copper, lead, and arsenic, and, in color and resistance to chemical action, would closely resemble pure gold." It is easy to see how this could have been taken as a transmutation.

In other cases the results are completely baffling, as in "The 33rd Experiment of Sol" on pages 113-114. The processes described run on for days and culminate in a waxy oil. The directions conclude: "Project one part thereof upon 100 of mercury: and it shall be all turned into medicine," i.e., into the transmutatory agent. And then, one part of this projected upon 500 parts of mercury will turn it all into "gold better and purer than mineral gold." But when the recipe is recast by Taylor in modern terminology, this is the conclusion reached: "A very weak gold amalgam would result, which when added to 500 parts of mercury would have no effect whatever." The author's comment here is one of the most significant paragraphs in the book:

> To such an anticlimax come all attempts to give a chemical interpretation to recipes for transmutation. The above is a recipe much more intelligible than most, describing chemical processes that can be identified, but ending up with the assertion of a transmutation that could not possibly result from the use of this material.

Sherwood Taylor has been doing this sort of research for a long time, and the

amount of it reported on in the present book is most impressive. He will be remembered by students of the subject as having offered years ago the first rational explanation of the *kerotakis* process of Mary the Jewess, with its color sequence of blackening, whitening, yellowing, and, in some versions, also purpling. This, the most famous single recipe in the history of Greek Alchemy, was parroted for centuries, obviously by persons who had lost all clue to its real meaning. Apparently the black stage was a copper oxide and the white an alloy of copper and mercury, which suddenly changes to yellow when the proportion of mercury drops to 13%. This was not gold, but an eager experimenter might think it was.

Alchemy was a perpetual triumph of hope over experience. Of the hundreds of recipes promising "gold better than that of the mines," not one ever succeeded, though some of the products had a deceptive golden appearance. But there were interesting, even valuable by-products—many types of laboratory apparatus were invented, and many new substances were discovered, including ammonia, the vitriols, the mineral acids, aqua regia, and distilled alcohol. Alchemy also set forth a striking new series of supposed facts, which the natural philosophers and the moral philosophers presently took account of and worked into their systems of thought. All of these by-products, both the physical and the mental, are touched upon in the book.

It is curious that a work so weighted on the chemical side should say nothing as to the derivation of the Greek name for the art. The word unmistakably goes back to the craft of the foundryman and metalworker. First there is the Greek verb χέω, to melt and pour, as in the casting of a bronze statue (inscription of about the 5th century B. C.); then its derivative, χύμα, an ingot or bar of cast metal (2nd century B. C.); and finally from this another derivative, χυμεία, the art of preparing metal ingots. This in time becomes a technical term for the artificial preparation of the precious metals, but at first (as in Zosimus, about 300 A. D.) it requires a qualifying phrase, "the χυμεία of silver or gold." Before the Arabic period, however, χυμεία can stand alone to denote the art of transmutation. Also, before Arabic times (about 700 A. D. or earlier), it seems to have been confused with χημία, apparently a Greek derivative of the Egyptian word *chem*, meaning black. The reasons are obscure, but the fact of the confusion is hardly to be questioned. Later the Arabs took over both spellings, χυμεία and χημία, prefixed their own definite article *al*, and handed the word on to the Europeans about the 12th century. The Latin has six or eight spelling, all quite interchangeable in meaning. *Alchymia, alchimia,* and *alchemia* betray their Arabic transmission; *chymia, chimia,* and *chemia* are more directly from the Greek; *archymia,* etc., are mere phonetic variants. Not until modern times was *chemia* (with its derivatives) separated off to denote the emerging science of chemistry, leaving *alchemia* (with its derivatives) for the whole previous development. To use "alchemy" for any period before the Arabic is an obvious anachronism, but a convenient one, which nobody at this late date will attempt to change.

If there is any disproportion in the Taylor survey, it is in the treatment of Chinese alchemy, which receives 8 pages as compared with 60 pages for the Greek. In a sense this may be fair, since the Chinese development, though older than the Greek by several centuries, was definitely less scientific. It began, in fact, on a level that the folklorists call "sympathetic magic." Gold, so the Chinese investi-

gators reasoned, ought to be the perfect medicine for human ills. It does not oxidize when melted over fire, does not tarnish or waste away, resists weather and most of the primitively known chemicals. Might one not hope that this "immortal metal," if it could be prepared as a medicine, would impart immortality to man? The Chinese experimenters so hoped, and they worked away at the problem for centuries, trying to turn gold, and later also silver, into edible, potable, or inhalable drugs. This is hardly a medical procedure, except perhaps in its proclamation of purposes. The voice, one might say, is the voice of the physician, but hands are the hands of the magician. Apparently the Greek experimenters with metals never had to go through any such medico-magical stage, probably because Greek science in general, and Greek medicine and biology in particular, were on so much higher a plane than the Chinese.

In time, alongside the search for the *chin-tan*, or "gold medicine," and doubtless partly as a result of it, grew up the search for the *huang-pai*, or "yellow and white." This was the effort to make gold and silver out of other substances, of which one of the commonest was cinnabar, a red ore of mercury. For a long time the searchers for the "gold medicine" looked down on the searchers for the "yellow and white" as inferiors, though probably the innovators were a shade the more objective and more progressive of the two. Eventually the *chin-tan* and the *huang-pai* became adjusted to each other as two branches of the same art. Thus Ko Hung (about 281-361 A. D.), outstanding scholar of the Chin Dynasty, devotes one chapter of his encyclopedia to the recipes of about 35 previous authorities on the "gold medicine" and another chapter to about 12 on the "yellow and white." Taylor passes all this over very lightly, alluding only once to the "yellow and white" and making no mention at all of Ko Hung.

From this point onward the art was always bifocal. Individual adepts might stress now one aspect, now the other, but both were in the tradition. Both in a sense were transmutational. The searchers for the *huang-pai* sought to transform the base metals or other ordinary substances into gold or silver, and the searchers for the *chin-tan* tried to turn these precious metals into life-preserving medicines. In this dual aspect the art seems to have been passed on by the Chinese to the Arabs, who blended it with what they could learn of the Greek χυμεία, added many experiments and discoveries of their own, and again passed it on, still in its dual aspect, to medieval Europe. Throughout its course European alchemy was also bifocal. Some of the adepts held, it is true, that one supremely powerful substance, which they often called the philosophers' stone, could perform both functions, not only transmuting base metals into precious but also preserving human beings against disease and death. But this, in such an art, was a mere detail. The two basic functions were still there.

At this point emerges one of the most interesting problems in the history of alchemy. It may be too soon to settle it, but at least the question can be raised. As between the Greek branch of the art and the Chinese, which, if either, is the main root from which Islamic and later European alchemy grew? In Taylor's mind it it pretty clearly the Greek. "It is certainly notable," he observes on page 71, "that the idea of the elixir as a medicine prolonging life was present to the Arabs and not to their Greek-speaking predecessors." And again: "The whole emphasis of the Chinese alchemists is upon the making of gold as a substance to confer longevity

or immortality in the body, an idea which does not appear to enter Western alchemy until the Islamic period." It is reasonably clear that this author thinks of the Greek development as the main stem of Western alchemy, and of the elixir of life as an idea that entered into it from the outside. But inasmuch as the entire Arabic and European evolution of alchemy is consistently bifocal, might it not be logical to seek the main source in the obviously bifocal art of the Chinese? Might not the Greek source be historically subsidiary, even though it was scientifically somewhat superior? It is easy to raise this question, but the final answer will doubtless require a wider and more carefully integrated study of Chinese, Iranian, Arabic, and 12th and 13th century European alchemy than has yet been made.

WILLIAM JEROME WILSON

H. M. SINCLAIR and A. H. T. ROBB-SMITH. *A Short History of Anatomical Teaching in Oxford.* Printed at the University Press, Oxford, 1950. 81 pp. Ill. 3s.6d.

This brief, tight-woven account of the history of the teaching of anatomy in Oxford will fill a need for both American and English students and physicians interested in the history of medicine. A Foreword by J. N. L. Myres, Librarian at Bodley and a Preface by W. E. Le Gros Clark, Dr. Lee's Professor of Anatomy, lend support to this well-balanced and stimulating story of anatomical teaching.

For a frontispiece, the authors chose wisely a photograph of Hogarth's "The Reward of Cruelty" to emphasize the only legitimate source of supply of bodies for dissection before the passing of the Anatomy Act of 1832. The sixty pages of text tells succinctly and accurately something of the average as well as of the great men of anatomy in Oxford; it also points up factors responsible for the advance in anatomy. In 1549 a new era in anatomical teaching had started in Oxford due to the enactment of Statutes which, for the first time, required that a student had to see and perform two dissections upon the human body during the six years of study requisite to obtain his B. A. In 1624, the Tomlins Readership in Anatomy was established which did "ordayne an Anatomye Lector . . . first and chiefly to the honor and glory of god 'but also because' the knowledge and true vnderstanding of man's body . . . is of great vse to the Professors of Divinitie, Philosophy . . . and more particularly for the faculties and Artes of Phisicke and Chirurgery." Later, the Tomlins Readership of Anatomy had to be held forever by the Regius Professor of Medicine. The latter part of the seventeenth century was the great age of Oxford science identified in part with names such as Highmore, Joyliffe, Willis, Wren and Lower. During the eighteenth century the teaching of anatomy was in the hands of unofficial teachers. The two books which many years exercised great influence were, Keill's *Anatomy of the Humane Body abridged* and Nicholls *Compendium Anatomicum.* The Lee Readership in anatomy was established in 1765. Thirty-eight years later (1803) the Aldrichian Praelectorship in anatomy was created. The subsequent years saw great reforms in University education with men such as Kidd, Acland and Rolleston making significant contributions. For example, the Chair held by Rolleston was divided into a Linacre Professorship of Human and Comparative Anatomy and a new Wayneflete Professorship of Physiology. Burdon-

Sanderson was the first one to hold the latter professorship, and it was he who introduced the teaching of anatomy and physiology simultaneously, since anatomy was essential to physiological studies, a move which has not been without its repercussions to this day. It might be argued that modern anatomical teaching stems in part from this vital change in the medical curriculum. Since that time, English anatomy has been nurtured under the able leadership of Thomson, Dodds-Parker, Whitnall and Le Gros Clark.

The value of this booklet is enhanced by the inclusion of twenty-one photographs of great clarity; by four Appendices which give a chronological table of anatomical teachers; the number of anatomy students from 1810-1849, a useful, working bibliography and a catalogue of exhibits displayed at the Radcliffe Science Library.

One would have liked to see more space devoted to the section on modern anatomical teaching; nevertheless, within the limits which the authors set themselves, this booklet deserves careful reading, and one may hope that another printing will provide it with a more durable cover.

BENJAMIN SPECTOR

ADOLF MEYER-ABICH (editor). *Biologie der Goethezeit.* Waltham, Mass.: The Chronica Botanica Co. [1949]. 302 pp. Ill. $5.50.

By acquiring the rights for the Americas, the Chronica Botanica Co. has facilitated the access to this German anthology originally published by the Hippocrates-Verlag Marquardt & Co. in Stuttgart. Both the editor, who is professor of the history of science at the University of Hamburg, and the publishers are to be congratulated on making available to a broader public these "classical essays on the foundations and main problems of biology by Goethe and the great scientists of his time: Georg Forster, Alexander v. Humboldt, Lorenz Oken, Carl Gustav Carus, Karl Ernst v. Baer, and Johannes Müller," as the subtitle of the book sums up the selection. Many of the short writings collected here (e.g. Oken: "Entwicklung der wissenschaftlichen Systematik der Thiere," Carus: "Welches sind die Anforderungen an eine künftige Bearbeitung der Naturwissenschaften?" and Müller: "Von dem Bedürfnis der Physiologie nach einer philosophischen Naturbetrachtung") are very hard to obtain, especially outside Germany, yet are extremely important for an understanding of romantic biology. The same cannot be said of the selections from Goethe which present about one half of the total material; however, they could hardly be omitted in a presentation of the biological thought which the editor connects with Goethe's name, too closely perhaps and at the expense of names like Herder and Kant. Goethe's contributions contain practically the only examples of what might be called biological research, all other dissertations presenting programmatic or critical evaluations of biology and its methods. The reader thus becomes well acquainted with the philosophical opinions of romantic biologists, while he has to learn elsewhere how they actually proceeded in their work. This comment seems pertinent in view of the framework the editor has given to his anthology. Professor Meyer-Abich is probably the most active present-day exponent of "holism," a philosophy which understands organisms as entities composed of members (not mere parts) and then uses this Ganzheit-Glied pattern

for other, non-biological, relations as well. There is, undoubtedly, a kinship between "holism" and romantic philosophy with its stress on "Ganzheit," and it is easy to understand that to the holist the biology of Goethe's time has much more than historical significance. But in the introduction, the prefaces to the individual selections, and a final chapter on "Goethe's principle of compensation, the first holistic fundamental law of modern biology," Professor Meyer-Abich stresses this significance to the point where the reader, who cannot follow him to his typological[1] and holistic[2] extremes, will lose rather than gain historical perspective. The physiologist, in particular, will raise the question as to how good a guide holistic philosophy is in modern biochemical and biophysical research and whether it is able to go beyond the philosophical rehabilitation of organisms as "Ganzheiten" and teleological concepts. This, in turn, may deflect his attention from the interpretation of the sources, especially since Professor Meyer-Abich offers relatively little help as to biographical details, explanation of terms, and interpretation of the historical situation beyond its "geistesgeschichtliche" evaluation.

The book presupposes a good knowledge of German, for though writing in a beautiful style (as the editor rightly remarks), the romantic biologists did not always write in a "popular" vein. But to all those who wish to penetrate into the biological thought of a period, remarkable for its philosophical awareness, the book will be a valuable addition to their library. The value of the book is further enhanced by the well reproduced portraits of all the authors assembled.

OWSEI TEMKIN

HENRY J. C. GIBSON. *Dundee Royal Infirmary, 1798-1948.* The Story of the Old Infirmary with a Short Account of More Recent Years. Dundee: William Kidd & Sons, Ltd., 1949. 71 pp. Ill.

A voluntary dispensary was first organised in Dundee in 1735—but nothing remains to be remembered of this service, until 1782 when a fresh subscription was opened. It was in this year that medical attendants were re-appointed by a dispensary committee to visit the sick poor in their own homes. This committee

[1] In the Introduction, Professor Meyer-Abich contrasts the static science of antiquity with the dynamic mechanics of the 16th-17th centuries and tries to show Goethe's synthesis of these two approaches, a synthesis which he considers significant for modern biology. These typological schemes seem somewhat forced. For instance: What is the criterium for the "true" Greeks (pp. 12 f. and 19)? How can Goethe represent a "dynamic renaissance of ancient science" (p. 34) if lack of dynamics is supposed to be one of the main characteristics of ancient science?

[2] For instance: ". . . alle künftige Naturwissenschaft wird von Ganzheiten handeln und dadurch holistisch sein oder sie wird überhaupt nicht sein" (p. 36). Is the "rein plastische Freude (of the "Bildungstrieb") am Gestalten und Umgestalten, ohne deren Wirksamkeit die Mannigfaltigkeit der organismischen Natur bestimmt (sic!) nicht verständlich sein könnte" (p. 293) more than an anthropomorphism? In fairness to the author it has, however, to be said that for more detailed discussion of his views he refers to his book, *Naturphilosophie auf neuen Wegen*, Stuttgart, 1948, Hippokrates-Verlag.

merged in 1793 with the Infirmary committee, when the latter was engaged in drawing up a constitution for a hospital and—unsuccessfully—persuading the Town Council to present a site. The final result was a two-storey building offering accommodation for 56 patients. There is some interesting detail about the nursing staff, the three forms of diet, expenditure and the attending medical staff (for practical purposes almost entirely, until 1836, consisting of surgeons). The report for 1841/42 shows out of 401 patients 323 cured, 40 relieved, 7 continuing as out-patients and 8 dead, with an average stay at hospital of 30 days. The number of operations performed was 49, including removal of cancerous growth in various regions and amputations of leg, thigh, and forearm—with not a single fatal issue. In this connection the help and encouragement given by James Syme to the staff at Dundee Infirmary should be remembered. The report for 1847/48 reflects the problems which fevers presented to the hospital authorities—necessitating expansion. Out of a total of 3697 patients treated, there were 1264 with "Typhus" (fatal in 205 cases) and 1840 with "Epidemic Fever" (with 30 deaths) as against 234 medical and 296 surgical cases. A much heavier toll was exacted by cholera (1832 and 1849)—173 dying out of 304 admitted as in-patients. Even after the new infirmary was opened in 1855, fever patients were distributed through the common wards with tragic effects from time to time, as in the year 1863-64, when three successive medical superintendents and a matron died of typhus fever. The well illustrated book (containing portraits of Dr. John Crichton, the lithotomist, 1772-1860; presidents, benefactors, and staff past and present) is full of factual and parochial information. This will prove one of the many invaluable sources for the general medical historian and encourage an attempt at integrating it with the economic, sociological, and medical standards of the late XVIIIth and XIXth centuries.

W. PAGEL

*THE BULLETIN RECENTLY RECEIVED:**

Gerasimos P. Alivizatos. *The Early Smallpox Epidemics in Europe and the Athens Plague after Thucydides.* Athens, 1950. 356 pp. (in Greek).

L. H. Butterfield (editor). *Letters of Benjamin Rush.* Published for the American Philosophical Society by Princeton University Press, 1951. 2 vols. lxxxvii + 1295 pp. Ill. $15.00.

Zachary Cope. *The Versatile Victorian.* Being the Life of Sir Henry Thompson, Bt., 1820-1904. London: Harvey & Blythe, Ltd., 1951. xi + 179 pp., 12s. 6d.

L. C. Dunn (editor). *Genetics in the 20th Century.* Essays on the Progress of Genetics during Its First 50 Years. New York: The Macmillan Company, 1951. xi + 634 pp. Ill. $5.00.

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* The *Bulletin* reserves freedom of decision as to the publications to be listed in this section.

Erna Lesky. *Die Zeugungs- und Vererbungslehren der Antike und ihr Nachwirken.* Akademie der Wissenschaften und der Literatur. Abhandlungen der geistes- und sozialwissenschaftlichen Klasse, Jahrgang 1950, Nr. 19, pp. 1227-1425.

Walther Riese. *Principles of Neurology, in the Light of History and Their Present Use.* New York: Nervous and Mental Disease Monographs, 1950. 177 pp. $6.00.

Royal College of Surgeons of England. A Record of the Years from 1901 to 1950. London: Royal College of Surgeons of England, 1951. 79 pp. Ill. 5s. (paper cover); 8s. 6d. (cloth binding).

Anne Tjomsland. *The Saga of Hrafn Sveinbjarnarson.* The Life of an Icelandic Physician of the Thirteenth Century. *Islandica*, vol. XXV. Ithaca, N. Y.: Cornell University Press, 1951. xxviii + 65 pp. Ill. $2.75.

CONTRIBUTORS TO THIS NUMBER

JOHN DUFFY, Ph. D., is Associate Professor of History at Northwestern State College, Natchitoches, La.

EDVARD GOTFREDSEN, M. D., is Professor of the History of Medicine at the University of Copenhagen. His address is Bredgade 62, København K, Denmark.

HARRY KEIL, M. D., is on the staff of the Montefiore Hospital for Chronic Diseases, Dept. Dermatology and Syphilis. His address is 509 Madison Ave., New York 22, N. Y.

WALTER PAGEL, M. D., is Pathologist at the Central Middlesex Hospital, Park Royal, London, N. W. 10, England.

MARK M. RAVITCH, M.D., is Associate Professor of Surgery at the Johns Hopkins University School of Medicine, Baltimore 5, Md.

T. A. SINCLAIR, M. A., is Professor of Greek at Queen's University, Belfast, N. Ireland.

BENJAMIN SPECTOR, M. D., is Professor of Anatomy and Professor of the History of Medicine at Tufts College Medical School, 136 Harrison Ave., Boston 11, Mass.

JOSEPH A. VASSELLI, M. D., submitted his essay while a fourth-year student at the University of Rochester School of Medicine. He is now an intern at the Jersey City Medical Center, Jersey City, N. J.

WILLIAM JEROME WILSON, Ph. D., is Chief of the History of Medicine Division, Army Medical Library, 11,000 Euclid Ave., Cleveland 6, Ohio.